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Contents:

	PAGE
Electrical Production in 1924	45
Substitutes for Casting	46
Trade Unions and Contracts Placed Abroad	46
Co-operation in the Cable Industry	46
Electricity Supply at Tientsin (*illus.*)	47
Wireless "Beam" Communication (*illus.*)	50
Enclosed-Type Switchgear, by G. W. Partridge (*illus.*)	51
The E.H.P. Conference at Paris, by R. Borlase Matthews	52
The New Railway Rates, by J. W. Parker	53
The Southern Railway Contract	55
A Croydon Wiring Scheme	56
Legal	56
Business and Industrial Notes	57
Lighting and Power Notes	62
Tramway and Railway Notes	64
Telegraph and Telephone Notes	64
Radio Notes	65
Contract Information	65
Notes	67
Institution Notes	68
Our Personal Column	68
Financial Section—	
New Companies Registered	69
Financial Section—*continued.*	
Official Returns of Electrical Companies	70
City Notes	71
Stocks and Shares	73
The Electrical Contractors' Association—II.	75
Estimating and Costing for Electrical Contractors, by J. Kirkham (*illus.*)	75
Electrical Showrooms, by H. E. Walker	76
Messrs. Walker's Showrooms (*illus.*)	78
The Institution of Mechanical Engineers (*illus.*)	79
Tramways and Light Railways Association.—I. (*illus.*)	80
New Electrical Devices, Fittings and Plant (*illus.*)	83
Electrical Production in 1924	84
Shipley's Electricity Supply (*illus.*)	85
Parliamentary News	86
Correspondence—	
Standardisation of Pressure	86
Fuses Operating on Short Circuit	86
The British Industries Fair	86
Cheaper Wiring	87
Published Specifications	87
Trade Mark Applications	87
New Work for Contractors	88

Electrical Production in 1924.

IN this issue we publish an article which we believe will form a work of reference for a long time to come. It is a reproduction of a preliminary report upon the 1924 Census of Production dealing with the electrical industry.

This sets out in some detail the selling values of all classes of electrical machinery and apparatus produced in 1924, compares the main sections with the corresponding figures for 1907 (the year of the last census), and also gives particulars of this country's electrical imports and exports. It must be observed that the production figures include the value of the work done in the installation of electric lighting and power and telegraph and telephone lines and apparatus. They do not include, however, a very large amount of machinery and apparatus produced by other branches of the engineering industry, some of which must have been directly electrical and some of vital importance to the electrical industry, *e.g.*, conveying and lifting machinery, boilers and condensers, and mining plant. It is explained that as there are many manufacturers of one class of machinery whose activities overlap into another, none of these branches can be completely isolated, but the separate aggregate given for each of the groups covers the bulk of the output of that group as shown in the aggregates for the trade as a whole.

Probably the most interesting table is that which compares the 1924 and 1907 figures, for it illustrates the marvellous growth of the electrical industry in the seventeen years, which period includes four war years. Measured by value alone, the total production in 1924 was 4.6 times that of 1907, and even allowing for differences in the price levels, the advance has been very considerable. While it is not easy to obtain a true view of the increase, owing to this question of prices, we believe that it can be said that improved methods of production and the widened market have tended to counteract the upward movement of prices engendered by the war.

The comparative statistics reflect so many interesting changes in the industry that more space than we have available at present would be needed to deal adequately

with them all. We may note, however, the far greater proportional advance in the production of convertors and transformers than in the manufacture of generating plant, great as the latter has been.

The largest proportional increase is shown by accumulators; the 1924 production was eight times the value of the 1907 production. The compilers put this down to the increase in motor vehicles; this and the development of radio (the full effect of which was not felt in 1924) probably explain the phenomenal rise.

One remarkable feature of the table is that while the general increase over 1907 was 360 per cent., the value of contract work rose by 138 per cent. only. No reasons for this are suggested in the report, and it remains a matter offering scope for interesting speculation.

A very satisfactory item is the output per person employed. Although over one quarter of the operative employés were females (a comparatively high proportion), the *per capita* production was £213, as compared with £194 for the prime movers and boilers group, £164 for marine machinery, £186 for textile machinery, and £187 for machine tools. It was exceeded only by the heating, ventilating, &c., group—£225. The average output for the engineering industry as a whole was £199, against £109 in 1907.

For further details we must refer the reader to the statistics themselves. No doubt at a later date more extensive information will be made available.

Substitutes for Casting.

TO-DAY, as never before, the need is for economy as well as efficiency. It is not sufficient that a component shall work well—it *must* do that; but it must also have been produced as cheaply as conditions will permit. Ways and means of production must be kept thoroughly up to date. Close inquiry into particular methods and types of construction is no luxury stunt; it is often a sheer necessity.

How many motorists, for example, realise the significance of the pressed-steel work which enters so largely into the construction of the modern car? Let them consider the alternatives in cast or forged material, and all that they would involve. There would be added weight and greater cost per item; also very considerably increased total weight, in many cases necessitating increases in driving power and size and price of engine and gear. The evolution has been steady and valuable.

What has proved so highly beneficial in motor-car construction, and in light constructional work generally, should give engineers in other branches of industry food for thought. Certainly very much greater use might be made of sheet and pressed steel work in ordinary machinery. For stationary parts not subjected to appreciable loading conditions, even the lightest castings are often needlessly heavy and cumbersome. They are also costly in material and production. Thus many electrical machines nowadays have their stator winding guards, and sometimes their air inlet shields, of planished steel. Not a few stator frames are light cast or rolled section frameworks closed in by sheet-steel plates.

Mr. W. L. Warner, in the *General Electric Review*, recently called attention to the part played by rolled material as a substitute for castings in G.E. products. Rolled sections, though primarily castings, are cast under the simplest conditions, without using patterns or having recourse to ordinary foundry methods. Consequently, the cost of later mechanical working, by which the components are brought to final shape, and which refines the grain and improves the physical properties of the material, is more than offset by the initial economy. The resultant cost is less, and the weight less, than that of an equivalent casting.

Welding is in considerable vogue, and is used in preference to riveting. Often where two to four men would be required for the latter process, one can undertake the former. In many cases, too, a welding machine is recommended.

The article gives several examples of welded structural steel components which have superseded the cast items of earlier designs. Thus, illustrations show a gear blank composed of rolled steel plates, an arc-welded die which has replaced more expensive cast-steel and drop-forged dies, an arc-welded structural steel bedplate for a motor-generator set, a vertical water-wheel generator which has a welded steel frame and also welded steel exciter bearing bracket, and finally, a synchronous condenser with welded steel frame and structural steel baseplate. The end covers or guards of the last-mentioned machine appear to be of planished sheet steel.

British electrical and other manufacturers are learning the use of sheet and rolled steel, but they have not nearly exhausted the possibilities in this direction. More thought, not less, on the *how* of constructional alternatives should result in substantial economy in overhead charges, and considerable reduction in total costs.

Trade Unions and Contracts Placed Abroad.

AMONGST the items of special interest that will be found in the present issue is a reprint of a statement made on behalf of the Electrical Trades Union, the Amalgamated Engineering Union, and the National Union of Foundry Workers, regarding the unfortunate consequences that may ensue from the placing of the Southern Railway contract for motor generators and transformers out of the British Isles for execution. Such matters must, of course, be placed on record in the trade and technical journals, because it is part of their weekly duty faithfully to record everything of any importance that is happening in the industry that they represent. But propaganda use of such events may be made by non-British interests which will operate seriously to the detriment of British industry. The Unions state that the direct loss of wages to our workers from the failure of their employers to secure the Southern Railway contract was a very large one, but they are evidently seriously impressed by the knowledge that the "repercussion of this unwise step by a British railway company is being felt in every part of the world." We dealt with the whole subject so fully in our issue of April 29th that we have little need to discuss the matter again now, but we may remark emphatically that if there are those amongst us who prefer to show hostility to British manufacturers by placing contracts abroad they will do well to recognise that by so doing they are not only depriving British work-people of work and wages, but are providing propaganda means for those who want to still further prevent overseas business from reaching these shores, thus preventing the absorption in industry of our army of unemployed.

Co-operation in the Cable Industry.

AT both Callender's and Henley's annual meetings last week further reference was made to the agreement by which these two companies and British Insulated Cables, Ltd., aim at co-operation in connection with certain of their activities. This agreement does not contemplate anything in the way of financial amalgamation; each party will continue to act independently in the conduct of its business and maintain its own connections. The principal aim is the interchange of experience, and the linking-up is mainly on the research side to which cable manufacturers are forced to give a great deal of attention.

It is also hoped by this means to strengthen the companies in their struggle against foreign competitors in overseas markets.

If, as was anticipated at the meetings, the arrangement results in lower selling prices, as well as better cables, not only the shareholders but also the customers will give their unqualified approval.

Electricity Supply at Tientsin.

Some Details of the Generating Plant, and the Annual Report for 1926.

THE Electricity Department of the British Municipal Council of Tientsin, China, of which Mr. R. A. Williams, M.C., B.Sc., A.M.I.E.E., A.M.I.M.E., is the electrical engineer, came into being in 1920; it has operated its own generating station

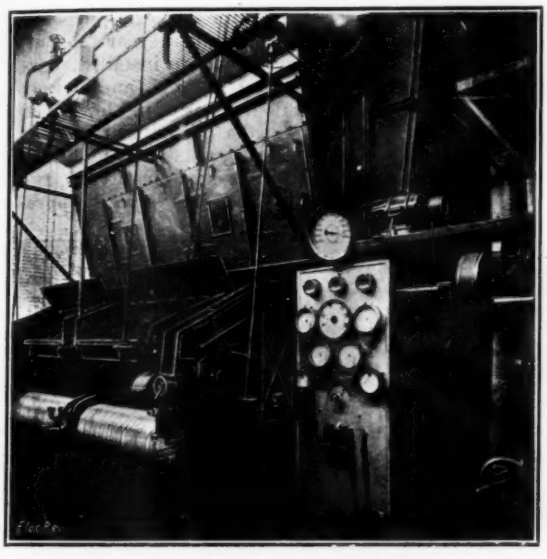


Fig. 1.—A New Boiler and Control Panel.

since 1922, and the gross profit, before providing for interest and loan repayment (or depreciation), represents 24.8 per cent. on the capital outlay, a better return than that earned by any municipal or company undertaking in Great Britain, and higher than any published in China. The engineer's annual report for 1926 shows that the year's income reached £47,890 and the net profit £11,970, the latter sum being slightly less than the 1925 figure; since 1920, the Electricity Department has returned no less than £55,240, or 50 per cent. of its capital outlay, to the Council's general funds, and the fact is worth emphasising that the capital outlay of £107,800 of this well-equipped undertaking represents the commendably low figure of £21.5 per kW, and covers not only the total cost of the 5,000-kW power station, but also that of the transmission and distribution mains, connections to consumers, meters, &c., being lower than that recorded by any other municipal system in China or Great Britain.

The station (figs. 2 and 3) now contains two Howden-G.E.C. steam turbo-generators of 1,250 kW each, and one Metropolitan-Vickers set of 2,500 kW; a duplicate of the last-named set is on order, and it is hoped that it will be in operation early in the autumn. Fig. 5 illustrates the J. & P. high-voltage switchboard and B.B. self-synchronising gear; the l.p. switchboard was constructed by the Department's own staff. In the boiler house a new marine-type boiler (fig. 1), with which an air preheater has been incorporated, was erected entirely by the Department's staff, and put into commission in 1926. Five Babcock & Wilcox boilers are now installed, with a total steaming capacity of 86,000 lb. per hour; fig. 4 shows the fan for the new boiler, and also the air ducts for cooling its driving motor, with a

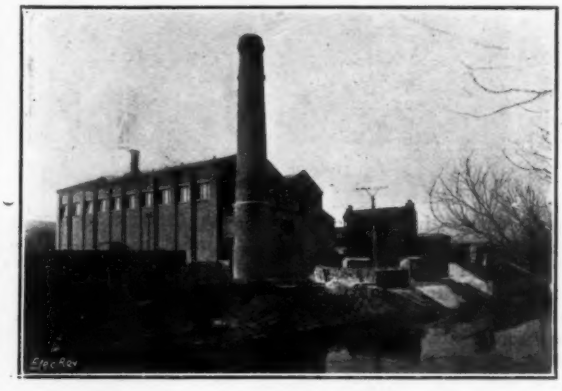


Fig. 2.—Tientsin Power Station.

spare motor on the right, and apparatus has been fitted to the new boiler to prevent the emission of dust. The total amount of coal consumed in 1926 was 8,725 tons, or 3.22 lb. per kWh generated, which, however, included the fuel consumed for the distillation of 150,000 gallons of water sold to ice and mineral water factories and that used for heating the station offices.

Transmission and distribution are carried out by means of an overhead system. During the year it was necessary to construct six new sub-stations, two of 50 kW, one of 75 kW, and three of 150 kW, besides

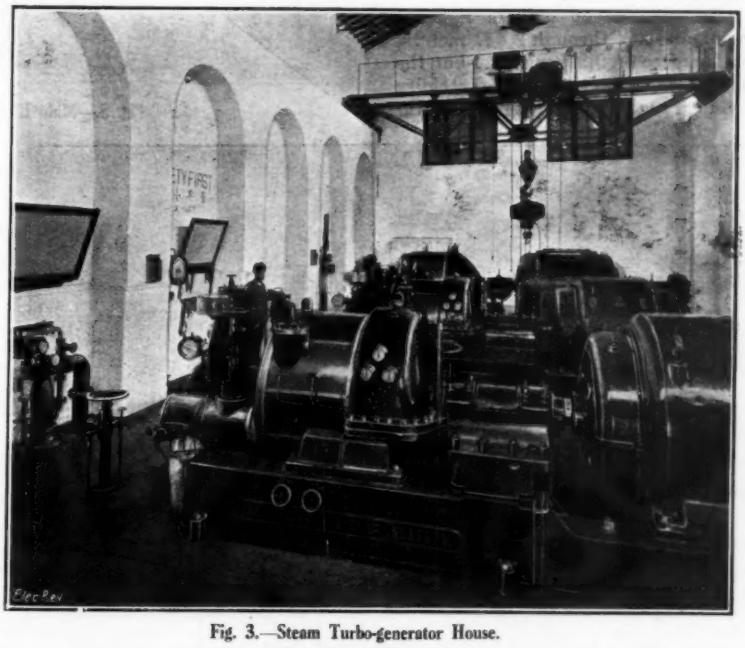


Fig. 3.—Steam Turbo-generator House.

doubling the capacity of three others; the total capacity of all the sub-stations is now 3,525 kW, and they are all of the outdoor type, figs. 8 and 9 illustrating typical examples mounted on concrete poles, and a thermal load indicator being visible in fig. 8.

The maximum demand of the year under review was 2,270 kW, an increase of 20.5 per cent., whilst the load factor of the distribution system was 25.2 per cent., and that of the generating system 30.6 per cent., the improvement in both cases being largely due to the greater use made of cookers and other electrical appliances. The total sale of electricity amounted to 4,720,506 kWh, which represents a satisfactory increase of 25.7 per cent., and compares favourably with the average increase in Great Britain of 9.5 per cent. Table I indicates the amount of energy sold for various purposes during 1926, whilst Table II shows that the charges for electricity in Tientsin are now about the lowest in the Far East. The total number of consumers at the end of the year amounted to 2,220, an increase of 9 per cent.; the average number of kWh sold per consumer amounted to 2,140 kWh, which is a fairly high figure, considering the lack of power load in the district.

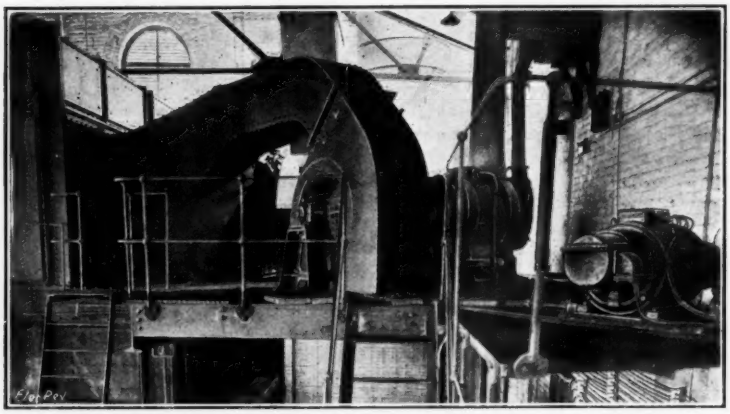


Fig. 4.—Boiler Fan Gallery.

The amount of private lighting was 2,598 kW through 2,457 meters, an increase of 9.2 per cent., but the actual consumption of electricity used through the lighting meters increased by 21 per cent., which is an indication of the increasing use of electricity both for lighting and also for small heating appliances that are connected to the lighting circuits.

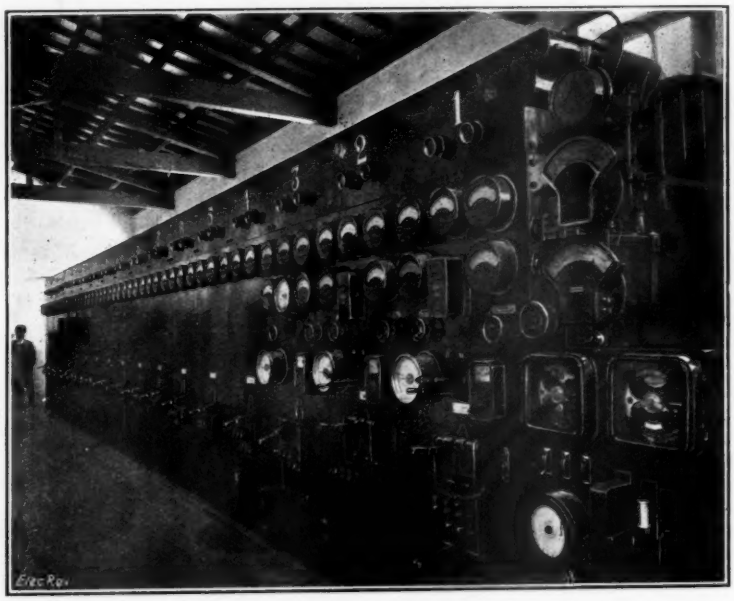


Fig. 5.—Main High-voltage Switchboard.

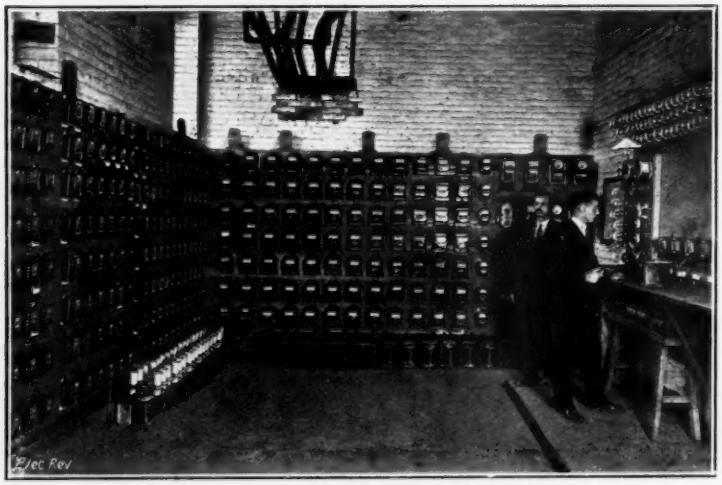


Fig. 6.—Meter Testing Room.

The use of electricity for power continues to increase, though the stagnation in trade retards progress in this direction very considerably. There was an addition of twenty-two motors (with a capacity of 259 kW) to the mains, which raises the total power load on the system to 2,012 kW, an increase of 15 per cent.

The energy sold for power purposes amounted to 1,124,876 kWh, but the increase in this case (43 per cent.) is much greater in proportion than the amount of new power connected, and it indicates that longer use is being made of the motors.

Importance is attached to the use of electricity for domestic purposes, and during the past year 28 new electric cookers were installed, having a load of 189 kW, and at least double this number would have been hired from the Department had the cookers been available; the hiring scheme for cookers instituted two years ago has been greatly appreciated, and cookers now connected amount to a total capacity of 556 kW, compared with 77 kW in 1924 and 367 kW in 1925, and the electricity used for cooking has been doubled during the past year.

Electric heating also increased very considerably during last winter (64 per cent.), notwithstanding the fact that it is more expensive than other forms of heating, whilst applications for purposes other than those indicated above are increasing daily; for instance, electric furnaces for melting steel and brass would have been employed in Tientsin but for the adverse trade conditions, and electric domestic refrigerators are in great demand in China; larger refrigerators for cooling and drying the air for large public offices and theatres are now in use in many parts of the world where the hot damp weather calls for them. The application of electricity for the welding of parts of structural and similar work has been extended by the Department for all new work that was formerly riveted.

The street-lighting system has been maintained in good condition, and a number of experiments has been carried out with enclosed types of lamps, but, unfortunately, not with entire success, owing to the very fine dust that gets through the best joints in the winter time and causes a great deal of trouble. The number of street lamps at present in use is 635.

The necessity of having showrooms for the demonstration of electrical apparatus is emphasised, and that at Tientsin (fig. 7) has proved its usefulness. During the year no fewer than 1,400 electric appliances of various kinds were sold from that showroom, and several hundred electrical repairs were carried out in the small service station attached to it; a good many more sales would have been made, had the stocks on hand been more ample.

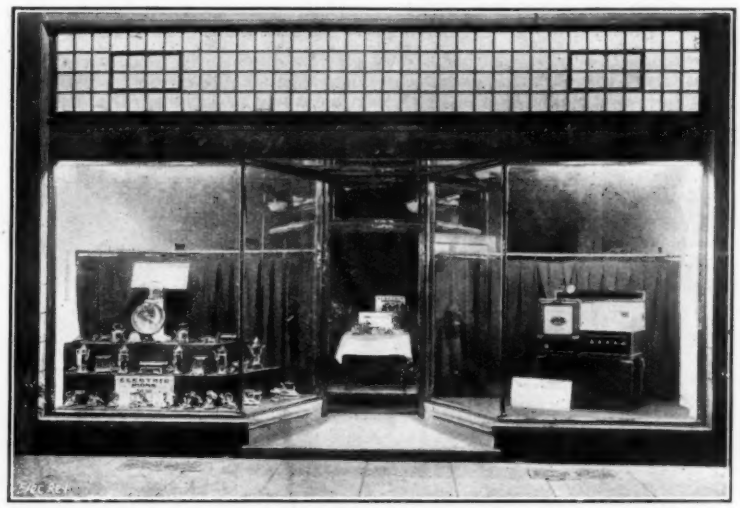
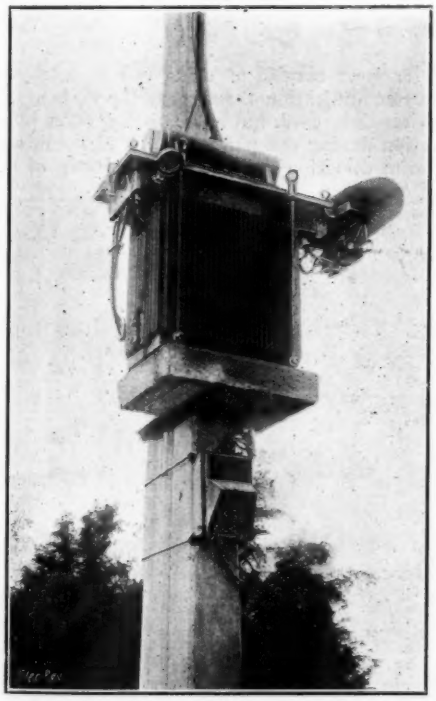
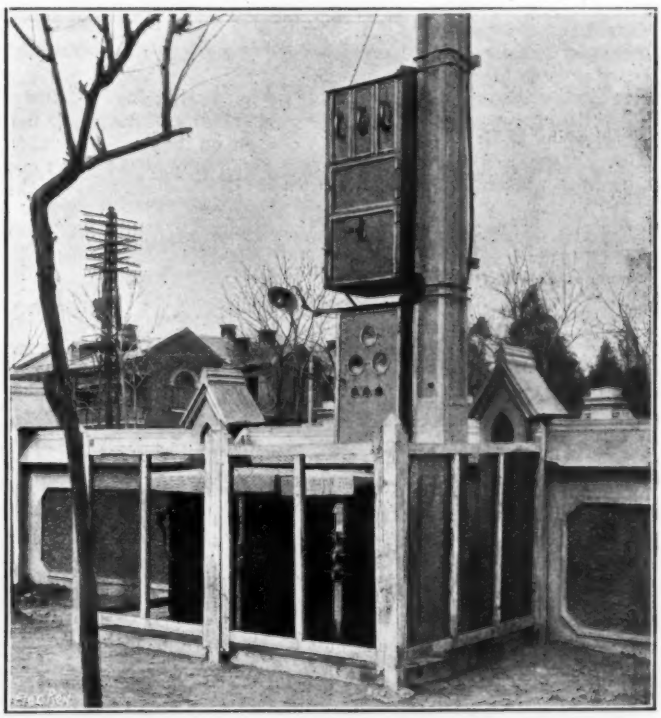


Fig. 7.—Showroom at Tientsin.

Mr. R. A. Williams acknowledges the able way in which Mr. A. M. Sillar, M.Inst.C.E., M.I.E.E., the Council's consulting engineer in London (to whom we are indebted for the particulars and illustrations reproduced above), has looked after the undertaking's interests, and commends the manner in which his staff has carried out its duties and the spirit of co-operation between the various sections of the Department, which has been very evident when one branch has called for assistance from another. He has experienced no labour troubles throughout past years, which fact, in conjunction with the results of the year's working, cannot be regarded otherwise than as generally very satisfactory, particularly when the adverse trade conditions and the prevailing civil commotion in China are considered, for the period covered by the report was the most critical through which China has passed since the Boxer madness of 1900. The Tientsin area supports an estimated population of 838,629, and, in addition to the British municipal plant, which furnishes electricity in the British and ex-German concessions, a French municipal undertaking is in operation, and another in the Japanese concession, besides the Compagnie de Tramways et d'Eclairage de Tientsin, a Belgian concern which, as its name implies, supplies energy in the city and for tramway traction purposes; its capital is Fcs. 6,250,000, and its generating plant is rated at 6,000 kW.



50 kW.



150 kW.

Figs. 8 and 9.—Typical Pole-type Transformer Sub-stations.

TABLE I.—SALE OF ENERGY AT TIENTSIN.

Service.	Energy sold, kWh.	Increase, p.c.
Private lighting	1,859,640 ...	21
Power	1,124,876 ...	43
Heating	216,263 ...	64
Cooking	221,347 ...	102
Street lighting	250,280 ...	8.8
No. 1 special area	1,048,100 ...	9.3

TABLE II.—ELECTRICITY RATES AT TIENTSIN.

Lighting	= 4	pence per kWh.
Power (up to 50 kW)	= 1.3	,, ,,
,, (over 50 kW)	= 0.77	,, ,,
Heating	= 1.1	,, ,,
Cooking (up to 2 kW) ...	= 1.1	,, ,,
,, (over 2 kW)	= 0 77	,, ,,

Wireless "Beam" Communication.

Details of the short-wave service tested for the Imperial Telegraph Service between England and South Africa.

THE short-wave "beam" radio-telegraph stations which have been built by Marconi's Wireless Telegraph Co., Ltd., on behalf of the British Post Office authorities for communication with South Africa have successfully passed their official seven-days' test, and the inauguration of a direct wireless - telegraph service between London and Cape Town took place on July 4th. This is the third group of "beam" stations to be completed for direct communication with the Dominions.

The first experimental tests showed that communication between England and South Africa could be maintained for a longer period than the 11 hours required under the conditions of the Marconi Co.'s guarantee to the Post Office, but as the tests proceeded it became clear that the wave-length originally selected was too long to give the maximum period of communication during daylight hours, and necessitated certain modifications. The stations are the first to actually operate on the dual-wave principle, using one length for daylight and the other for night communication.

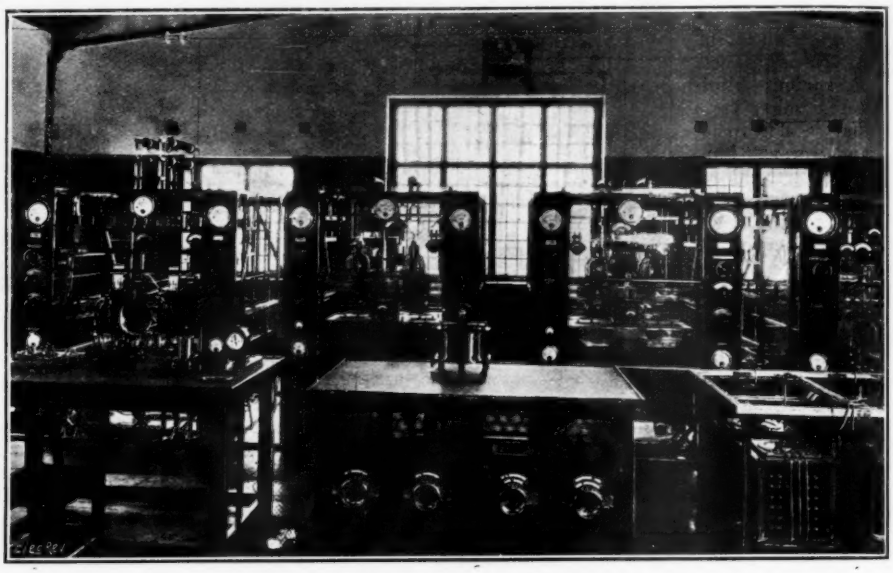


Fig. 1.—Transmitting Apparatus at Cape Town.

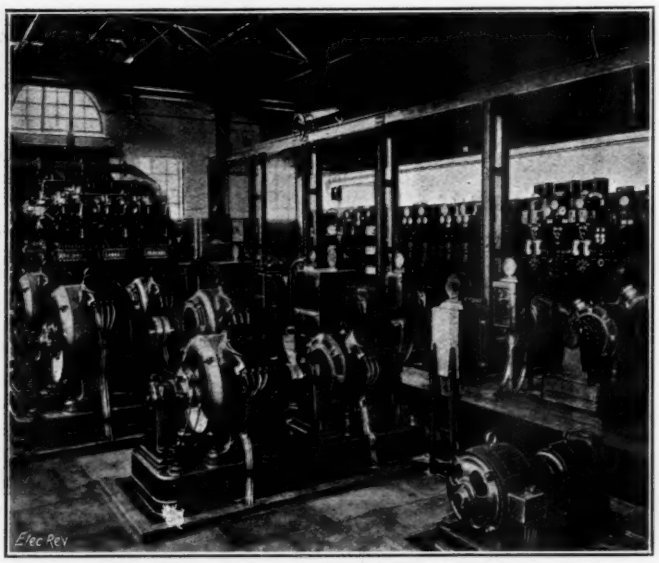


Fig. 2.—Power Plant at Klipheuvel.

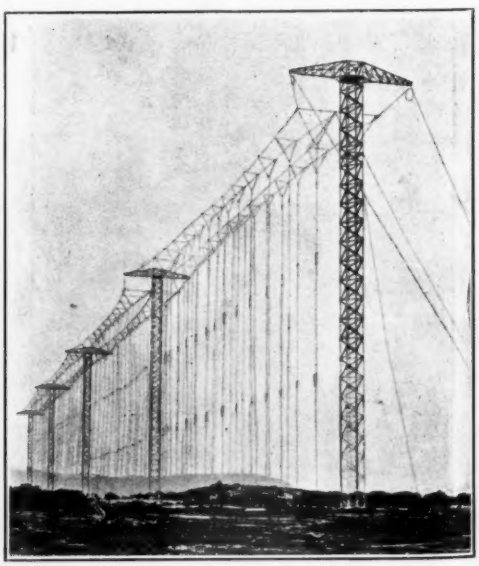


Fig. 3.—The South African Receiving Masts.

The standard time of the Union of South Africa is only two hours fast of Greenwich mean time, and sunrise and sunset in both countries therefore occur at nearly the same time; thus the signals in the path of the "beam" between the two countries travel almost completely in darkness or in daylight, as the case may be, and the wave-lengths most suitable for this service have proved to be 16.146 metres during daylight and 34.013 metres during darkness. In the case of the Australian service,* instead of using two wave-lengths to maintain communication throughout the 24 hours, a single wave-length is used, but transmission takes place in one direction during one portion of the 24 hours and in the opposite direction during the remainder of the 24 hours, according to which section of the earth between England and Australia is in darkness at the time transmission is in progress.

* ELEC. REV., April 22nd, 1927.

The stations communicating with South Africa have been built on the same sites as those which communicate with Canada,* the transmitting stations being at Bodmin, in Cornwall, and the receiving stations at Bridgwater, in Somerset. The transmitter for South Africa is in the same room as the one engaged in the Canadian service, and it is of similar design; but an entirely separate aerial and reflector system, aligned so that the signals are reflected accurately in the direction of South Africa, is situated on the eastern side of the transmitter building, the Canadian aerials being on the western side. The aerial and reflector system is suspended from five 300-ft. steel lattice towers, two of the four bays being used for transmission on 16 metres and the other two for transmission on 34 metres. The receivers at Bridgwater are also installed in the same room as those receiving from Canada, but there is a separate aerial and reflector system for each service.

Both the receiving and transmitting stations are directly connected by land lines with the Central Radio Office at the General Post Office, London, where the signals are controlled, operation at the wireless stations being entirely automatic. It was this instantaneous method of communication and the high speed of operation, which are features of the "beam" system, that enabled a record to be established this year when the result of the Derby was known in Australia within three seconds of the first horse passing the winning post.

The transmitting station in South Africa, which has been built by Marconi's Wireless Telegraph Co., Ltd., for the Wireless Telegraph Company of South Africa, is situated at Klipheuvel, 30 miles north-east of Cape Town, and the receiving station at Milnerton, five miles north of Cape Town. They are in all respects similar to those at Bodmin and Bridgwater, their wave-lengths being 16.077 and 33.708 metres. The first of the accompanying illustrations shows the Klipheuvel transmitting apparatus: from left to right the panels are (*a*) No. 1 magnifier common to both wave-lengths; (*b*) drive, No. 3 magnifier and No. 2 magnifier for one wave-length; (*c*) drive, No. 3 magnifier and No. 2 magnifier for the other wave-length; (*d*) absorber and signalling panel; in the foreground are the control tables with the land-line control gear and standard wave-meter. Fig. 2 is an interior view of the machinery hall at Klipheuvel; in the left background are the two engines coupled to d.c. dynamos which generate power to drive the motor-generator sets seen in the foreground, which energise the valves. Fig. 3 shows the masts that carry the receiving aerial and reflector system at Milnerton; they are 300 ft. high, and the distance between them is 650 ft. Two bays are used for reception on each of the two wave-lengths.

* ELEC. REV., October 29th, 1926.

Enclosed-Type Switchgear.

A brief summary of the advantages of this method of construction, and an arrangement of interest in connection with the use of single-core lead-covered cables.

By G. W. PARTRIDGE, M.Inst.C.E., M.I.E.E.

THE two recent articles on the above-named subject*, together with your subsequent correspondence relating thereto, including special reference to the position and methods of moving the main oil-immersed switches, &c., and the danger to the main bus-bars in the event of a switch explosion taking place, have prompted the following observations.

Being anxious to extend the switchgear at the Deptford electricity generating station†, London, in very limited space and, at the same time, to eliminate the danger which the cleaning of such apparatus involves, together with that of exposed live conductors, a type of switchgear was designed 17 years ago which might be termed semi-enclosed, and is somewhat different from the other types on the market. In this design of switchgear lead-covered bus-bars are used, supported throughout their whole length so as to make movement due to mechanical stresses impossible.

The oil switch, which may be considered the source of the chief danger from the explosion point of view, is placed on the floor above, so that the wreckage of any oil switch cannot affect the main bus-bars. The isolators, which are ironclad, are worked under oil and are interlocked with the oil switches they control, together with the duplicate bus-bars to which they are connected.

This gear has worked satisfactorily ever since it was installed, and, owing to its foolproof construction, has on more than one occasion prevented serious accidents to employés and plant being caused by men, in moments of forgetfulness, trying to examine and make "dead" running machinery.

The advantages of such construction may be summarised as follows:—

(1) It is impossible for a short circuit to take place between the phases of the bus-bars before one or the other has been earthed.

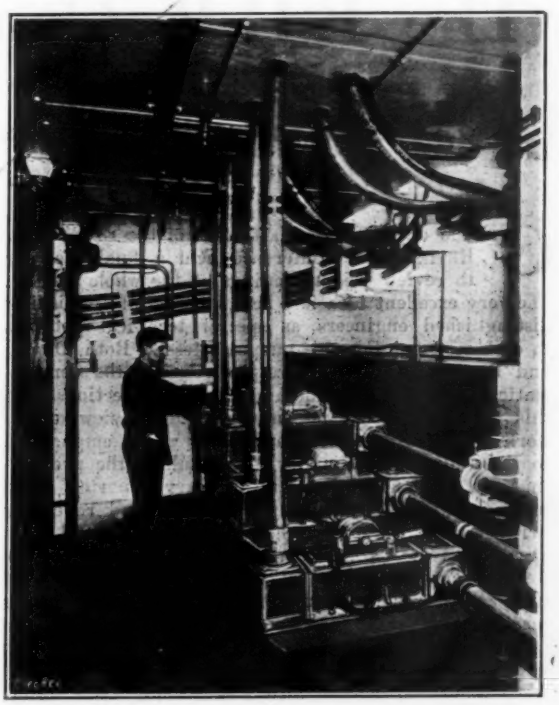


Fig. 1.—Special Bus-bars and Isolating Switches at Deptford.

(2) The explosion of an oil switch cannot damage the main bus-bars.

* ELEC. REV., May 27th and June 24th, 1927.
† ELEC. REV., June 3rd, 1927.

(3) The series transformers (a weak point in many systems) are clamped outside the lead-covered cable, making a failure in this part of the system impossible; these transformers can, moreover, be placed in any position and can be removed and tested without interfering with the supply circuit.

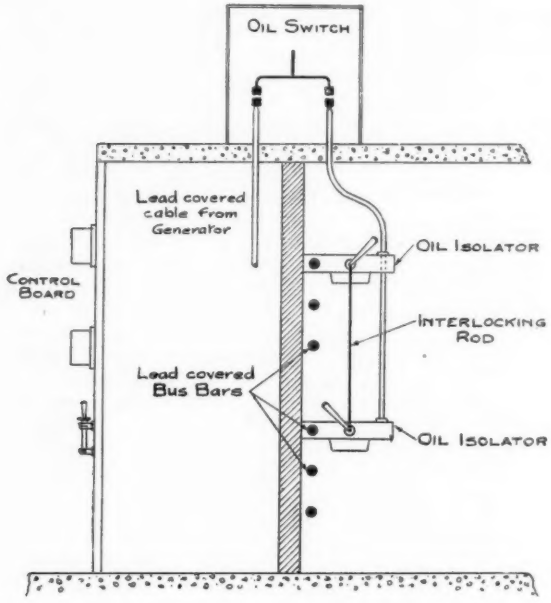


Fig. 2.—Oil Isolators, showing one Phase only.

(4) The actual isolators are mechanically interlocked with one another by means of a steel rod, and are also interlocked with the control switches of the main oil switch.

(5) No cleaning of the apparatus is necessary, and no metal carrying current is exposed.

(6) The main bus-bars and cables are free to expand longitudinally, which is an important consideration in all enclosed systems carrying heavy currents.

(7) It is not necessary to employ heavy lifting tackle for the main oil switches, as they are not moved and can be inspected *in situ* when made "dead" for the purpose.

(8) It is impossible to connect the duplicate bus-bars to the same oil switch, and no isolator can be moved unless the oil switch it controls is in the "off" position.

It may be interesting to state that the aerial bomb which fell on this switchboard during the late war, whilst entirely demolishing the control apparatus and instruments, did practically no damage to the main apparatus.

The accompanying illustration (fig. 1) of a section of the apparatus at the back of the traction switchboard in the Deptford power station shows only one set of bus-bars in use and the necessary ironclad isolating switches; since the photograph was taken, duplicate bus-bars have been installed with duplicate isolators, which are mechanically interlocked as indicated in the sketch (fig. 2). The position of the isolators is shown on the control board by means of special lamps, the wiring of which can be seen in fig. 1. Special means are provided for indicating when all three phases are in the "on" or "off" position.

Many of the advantages of the lay-out outlined above are now common to other types of switchgear, but since single-core lead-covered cables are likely to be used in the future the arrangement described may be of interest to others.

The E.H.P. Conference at Paris.

A Review of the Proceedings.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

(*Continued from page* 11.)

ON the day after the last issue of the ELECTRICAL REVIEW, the Conference held a final meeting to review the proceedings of the whole session. The very excellent idea had been adopted of appointing distinguished engineers as special technical reporters to each section. For this purpose Messrs. Roth, Duval, and Parodi, were elected respectively for the Central-station, Transmission-line and Operation Sections. In this way, a very concrete and accurate review of the work done was rendered available, which emphasised to the audience the quality and result of the proceedings, in a manner that an ordinary reporter could not emulate. Incidentally the short-hand reporting arrangements were very efficient, as a copy of each speaker's remarks was available on the following day for any correction that might be required. (One of the general reporters used a silent short-hand typing machine.)

M. Cahen presided over this last meeting. In addition to the reading of the summaries by the technical reporters, the committees called for as a result of the discussions were appointed. The subjects covered were insulating oils; dielectrics; cables; parallel running of central stations; oil switches; power-factor; telephone communication on high-pressure lines; standardisation of electric power statistics; and rational utilisation of fuels. Dr. Mailloux, in his joint capacity as vice-president of both the I.E.C. and this Conference, pointed out the general lines of co-operation between these two international bodies and drew attention to the fact that this Conference could do a great deal of most useful work in preparing the ground for the I.E.C. Incidentally, he remarked that the American section of the I.E.C. was the controlling body in that country that dealt with the appointment of representatives on all international bodies which were interested in any way in electricity. In that country, this saved much overlapping. Further, every other country knew to whom to apply in connection with any matter affecting electrical interests, thus providing a clearing-house.

In Great Britain the Institution of Electrical Engineers virtually acts in the same capacity. As, however, this is not definitely confirmed, a movement is on foot in England to get a decision on the matter. France and some other countries have appointed central authorities, and it is hoped that all other countries will follow suit, as thereby much confusion will be avoided and work generally will be facilitated. Great Britain, France, the Netherlands and some other

countries have appointed special committees to deal with the Paris Conference, and the hope was expressed that other countries would do likewise.

It was decided that the next Large Electric Systems Conference should be held in Paris in 1929, between the dates of May 15th and June 15th, preferably in the third week of May.

It was proposed by the Swiss first delegate (M. Perochet) and carried unanimously that the scope of the next Conference should be the same as that of the present one, as it was felt that the present programme was very satisfactory and it would be wise not to extend the syllabus.

In view of the necessity for a clear demarcation as to the definite scope of each international conference, Mr. R. Borlase Matthews proposed that this Conference should officially communicate its syllabus of subjects to all existing international electrical organisations; in this way any over-lapping would be avoided. This proposal proved to be very popular, and after an enthusiastic discussion, was carried unanimously. It is to be hoped that the effect of this resolution will be to remove some of the petty jealousies that have already arisen among international bodies.

Dr. Mailloux moved that a communication should be sent to the President of the French Republic (M. Doumergue) to record the appreciation of the members of the honour he had accorded the Conference by receiving twenty-one delegates, representing seventeen countries. Of these, Mr. F. Clough (who had been appointed as the First British Delegate during the last half of the Conference), Mr. R. A. McMahon, and Mr. R. Borlase Matthews, had the honour of being presented on behalf of Great Britain.

It was reported that 525 members had attended the Conference. At the next conference it is proposed to limit the number of papers to fifty, as this time the proceedings were rather too congested.

The Conference closed with the usual votes of thanks, a marked feature, however, of which was the long-continued applause given to Mr. R. A. McMahon for the wonderful way in which he had interpreted the proceedings. In fact, it was stated that his *précis*, as a rule, was often a better one and more to the point than that of the original speaker.

Now that a definite demarcation of the programme has been decided upon, it is to be hoped that British Engineers will be able to devote more attention to this particular Conference.

Apparently it is a characteristic of our race not to join to a great extent in discussions, unless the speaker feels he is really a master of the subject. The Continental engineer has not the same scruples, with the result that the discussions are really made of much more value than they would otherwise have been. The same remark applies to the presentation of papers.

(*To be continued.*)

The New Railway Rates.

Their Effect upon the Electrical Industry.

By J. W. PARKER, A.M.Inst.T.

AS is generally known, railways charges have been undergoing investigation for the past six years with the object of evolving a new system. Seeing that nearly forty years have elapsed since the last revision was commenced, some alteration is no doubt due. To begin with, a new and extended classification has been drawn up.

Instead of eight divisions we are to have 21 in future. This means that the present Class "A" will be split into two new divisions 1 and 2, and "B" will be replaced by Nos. 3-6, whilst "C" will give way to Nos. 7-10. What is now class 1 will be split into divisions 11-13; similarly, No. 2 will become 14-16, and the position of "3" will be taken by 17 and 18. Nos. 19 and 20 will occupy the positions of to-day's 4 and 5. The remaining class, No. 21, is a special division which consists chiefly of articles mentioned in the Carriers' Act, and for the time being may be disregarded.

After more than 30 years' familiarity with the present eight classes, it is sure to take time before the new numbers are understood. Some assistance in this direction will be gained if the new and old classifications of various electrical goods are compared. Accessories such as adapters, bell pushes, ceiling roses, cut-outs, fuses and switches of earthenware and metal go from Class 3 to 18, as do distribution boards and arc lamps, packed. Electric stoves and heaters when polished or enamelled are now in No. 4 but under the new order, they will be found in 19. Switchboards now in Class 2 will go to 16 as well as electrodes and packed dry cells. The new Class 20 will contain electroliers, now in No. 5, whilst 19 takes telephone instruments, apparatus and switchgear, now to be found in 4. No 17 takes in raw rubber from No. 3, whilst insulators come into No. 12. Electric light fittings, resistance wire (not insulated), batteries and vulcanite, all go to make up the new eighteenth division. Those lamps at present figuring in the fourth class are removed to 19, cable from 2 to 16, electric bells from 4 to 19, and cable junction boxes from "C" to 8.

The foregoing, however, do not represent the full extent of the classification changes as the minimum wagon load requirements applying to the lower classes have been increased. The mineral classes "A" and "B" are quoted for 4-ton loads, whereas the new equivalents Nos. 1-6, are for 6 tons per wagon. In the same way, instead of a 2-ton minimum for Class "C," Classes 7, 8, and 9 call for an increase of 100 per cent., only No. 10 retaining the original 2-ton requirement. Alterations of this character will necessitate considerable changes in the loading of some of the raw materials of the electrical industry if the lowest rates are to be secured in the future. The tendency towards increased wagon loads breaks entirely fresh ground in requiring that No. 11, which is one of the equivalents of to-day's Class 1, shall supply minimum loads of 2 tons per wagon. Nowadays such a requirement is confined to the lettered classes. Where less than the stipulated quantity is forthcoming, the new rates will be as follows:—

Classes 1-6 (present-day Classes "A" and "B.").	
Under 6 tons but not under 4 tons per wagon	Class 7
Under 4 tons but not under 2 tons per wagon	Class 10
Under 2 tons	Class 12
Classes 7-9 (present-day Class "C.").	
Under 4 tons but not under 2 tons ...	Class 10
Under 2 tons	Class 12
Class 11 (present-day Class 1.).	
Under 2 tons	Class 12

As iron and steel and most of the heavier raw materials of the electrical industry come within Classes 1-11,

the importance of complying with the increased minimum wagon loads becomes obvious.

An important portion of the new classification book is given over to machinery which is arranged in sections lettered A-K. A case in point is provided by dynamo bases in section "B" classified as follows:—In 5-ton lots, Class 12; in 2-ton lots, Class 14; less lots, Class 16. Here, again, the wagon load is a most important factor.

It will be gathered from what has already been written that the new volume is considerably more complicated than the book at present in use, and for this reason warrants close attention before the changes actually come into effect. The revised rating system will be better understood if it is compared with the existing method, which is based upon the principle of maximum charges laid down by Parliament. So long as these maximum rates are not exceeded the railways have a fairly wide discretion as to the precise amounts which they can levy. This arrangement is now to be set aside in favour of the principle of "standard revenue." The underlying intention is to secure to the railways a more or less fixed net revenue based upon the amount received in the year 1913, plus certain additions found to be necessary owing to the changed circumstances of recent years. The fixed or standard revenue is to be obtained by adjusting rates and fares to such a level as will yield the prescribed sum. As traffic fluctuates considerably the tendency will be for charges to fall during busy times when carryings are plentiful and to rise in periods of depression when traffic is scarce. The task of securing the requisite revenue does not fall to the railways but to an independent body set up by the Railways Act, 1921—the Railway Rates Tribunal.

Since the Tribunal is designed to be a recognised means of settling disputes between railways and traders and, indeed, to govern nearly all the commercial intercourse of the two, it is very necessary that its constitution and duties should be thoroughly appreciated by all in business. In the first place it is a court of record, consisting of three members, a lawyer (who is chairman), a railway expert and a business man. The presence of the last named means that trading interests have now a share in determining what rates shall be levied, and, in effect, how the commercial side of railways shall be conducted. Whilst it is a long overdue concession to business interests it is no less a responsibility in that traders are concerned not only in lowering charges but in making the railways successful business undertakings. Besides having authority to fix through rates, the tribunal has power to determine questions of classification, group rates, tolls, terminal amounts, siding charges and rebates, together with power respecting the conditions of carriage and packing regulations.

Perhaps the new Court's strongest recommendation lies in its being a business rather than a legal tribunal. On questions of fact, its decisions are final and appeals to higher bodies can be made only upon points of law. Moreover, costs, for the most part, will not be awarded in actions before it, exceptions being made where vexatious or frivolous cases are brought up. At the present time the usual method of settling a dispute is by resorting to what is generally a costly legal action. This is a state of affairs rarely satisfactory to traders.

In considering the new rates the governing requirements of "standard revenue" have to be kept constantly in mind. Towards this end a schedule of the new standard or class rates has been drawn up and provisionally approved by the Tribunal which considered that with one or two exceptions relativity between the old and the new figures has been maintained. The revised schedule provides for rates being about 60 per cent. over pre-war figures, or at approximately the same level as they are to-day. The effect of the increased number of classes should, however, not be lost sight of. The same schedule applies to all railways and when the different circumstances of the various lines are taken into account, the production of a list common to all is a really noteworthy achievement. Unfortunately there is no guarantee that this happy state of affairs will be permanent because a review of charges has to be undertaken periodically, and rates adjusted upwards or downwards in accordance with the amount yielded.

In connection with exceptional rates, it is apparent that some control must be exercised or the principle of fixed revenue may be jeopardised. Consequently these figures will in future be cancelled unless they are more than 5 per cent. and not more than 40 per cent. below the corresponding standard or class charges. In some circumstances, rates more than 40 per cent. below the standard may be continued subject to special arrangements. New rates to be granted in the future will also have to come within these limits. This requirement will naturally reduce the quantity of exceptional rates, but they will still continue to exist in large numbers under the new regime. At one time it was the intention to effect a sweeping reduction in the quantity of these lower charges, in fact the enlarged classification was introduced with the idea of absorbing them in large numbers. It was thought that introducing new classes at the points where exceptional rates were greatest would effect a large reduction, but subsequent experience has failed to substantiate the theory.

A useful innovation of the Railways Act lies in the requirement that any trader may apply to the Tribunal to fix a new exceptional rate for him. At present the granting or withholding of such figures is at the sole discretion of the railway companies. Should an application to the railways be refused the trader will in the future be able to approach the Tribunal. One advantage of having an exceptional rate fixed by the Tribunal is that the railway will not be able to withdraw it without permission from the court, so that it will be of a more permanent character than a voluntarily conceded figure.

A very rough idea of the level of future rates can be obtained by bearing in mind the 5-40 per cent. stipulation, but complications arise from the fact that the Railways Act provides for the new charges being upon a "station to station" basis instead of "C and D" as most of the numbered classes now are. Although the "S to S" basis favours works having private sidings, it is a decided drawback to firms engaged in the lighter side of the industry as it will result in three charges, *i.e.*, rail transit and cartage at each end, being raised. Recognising this, the railways have agreed to "C and D" quotations being continued in at least some instances.

The new charges are likely to bear more heavily upon short-distance than long-distance traffic, as two considerations combine to reduce the burden on the latter. The first is continuous mileage, which means that instead of the rate beginning afresh on exchange to each separate company as it does to-day, the revised quotations are reckoned as if the entire journey were over the line of one company.

The other factor is the obligation to compile rates upon the shortest working distance between the two points concerned. As the railway amalgamations of several years ago made numerous new and shorter routes practicable, a lowering of charges should result in some instances.

To return for a moment to the question of the periodical review of charges, it should be pointed out that from one point of view this is to be deprecated. Apart from the post-war period, one of the best features of British rates has been their stability, a feature which has allowed traders to enter into long-term contracts with a greater feeling of security than would otherwise have been possible.

The new system will come into being on the "appointed day," which is not yet definitely fixed, but the Minister of Transport, speaking a few weeks ago, said that so far as could be ascertained, January 1st, 1928, would be the selected date. If this is so, the intervening period is by no means too long to enable the new methods to be studied and the necessary alterations and adaptations carried into effect.

The Southern Railway Contract.

A Statement by Trade Unions.

WE have received a communication, which we reproduce below, reviewing the reasons why the rotary convertor and transformer contract of the Southern Railway Company was placed with a foreign firm. It purports to contain the views held by trade union leaders connected with the branches of the electrical and allied industries as a result of their investigation of the matter. It will be recalled that we dealt with the subject fully in the ELECTRICAL REVIEW for April 29th, pp. 665 and 701 and 702. The document now received reads as follows:—

Southern Railway Company's Electrical Contract. Why it Went Abroad.

"Representatives of the parties directly interested in the electrical industry, in their endeavour to secure more trade and employment, have been the recipients of a singular demonstration, as will be seen in the subjoined account dealing with the circumstances surrounding the disposal of the recent electrical contract by the Southern Railway Company.

"Since the announcement of the contract to a Swedish firm was made, trade union representatives concerned with the particular plant required have been given the opportunity of making a full investigation into the whole of the particulars. Their conclusions are to the effect that a very serious bar has been set up to the further development of the electrical and allied trades in this country, and that a false impression has been created amongst public and semi-public bodies in particular, regarding the methods of tendering at present in vogue.

"The following communication is signed by Mr. J. Rowan, Electrical Trades Union; Mr. J. T. Brownlie, Amalgamated Engineering Union; and Mr. T. Chadwick, National Union of Foundry Workers:—

Memorandum.

It will possibly help to a proper understanding of the Southern Railway contract for rotary convertors if a simple and non-technical description of the apparatus required is set out.

Apart from generating plant and cables, the majority of the plant required for a railway electrification such as the Southern, consists of motors and control gear which propel the trains, and rotary converting machinery which is situated in various sub-stations along the line.

It is generally accepted as fundamental that there should not be too many different types of motor or rotary convertor on any one electrified line, because of the difficulty regarding renewals and repairs and operation generally.

The first electrification after the war undertaken by the Southern Railway about four years ago resulted in large contracts being placed in England. The motors and control gear on the trains proper were divided between two firms, and the rotary convertors and switchgear divided by the railway company between three firms, and by placing with each third of the rotary convertors the equivalent switchgear, the workshops of the contractors were kept in proper balance.

The inquiry for the second extension of the electrified lines was sent by the railway company for the motors and control gear to the two firms who secured the first order, and for the rotary convertors to the three firms who secured the last order. The order for the motors and control gear was placed with one firm, and no difficulty arose until the quotations for the rotary convertors were received.

One of the three parties was unable to quote for the plant, and explained to the railway company that it could not keep the deliveries. The other two concerns, during the negotiations with the railway company, offered between them to carry out the whole of the work, and asked that the appropriate switchgear should be placed with each rotary convertor.

As to the advisability of contractors making every effort to secure switchgear as well as convertors, there can be no difference of opinion.

Although switchgear may be made under the same roof and in the same factory as rotating dynamo machinery, an entirely different class of workman is employed, and, in the main the proportion of each class of expert workmen is automatically determined by the amount of switchgear required to operate any particular machine. If one firm is offered the whole of the rotating machinery and another the whole of the switchgear, the shops of both companies become unbalanced, men are out of work in the switchgear department of one company and in the dynamo works of another.

Much distress and disorganisation would take place in the transfer of labour to suit unbalanced allocation of any particularly large contract, and in pressing for the equivalent amount of switchgear as part of the contract for rotating machinery, manufacturers were acting in the best interests of themselves and their workmen, and with no attempt whatever to dictate to any buyer beyond asking him to accept the reasonable condition that shops should, if possible, be maintained in a balanced state to ensure economical production.

The prices quoted by the British firms were reasonable, and, according to the statement made in the Press by the railway company, they had no complaint on this score, and their reason for placing this large order for rotary convertors and transformers abroad is undoubtedly misleading. It is only necessary to quote one instance of this from the official statement of the railway company, which reads as follows:—

> "The supply of the balance of seven machines was made conditional upon the contractor receiving from the company an order for certain other electrical apparatus which had formed the subject of a separate inquiry, and for which, in fact, the company had received a more favourable tender from another firm."

The answer to this is that, although the statement was issued on 19th April, the railway company had in their possession at that time letters from the two other firms asked to quote, dated the 6th April and the 8th April, withdrawing any conditions as to acceptance of the order.

It is understood that the Swedish General Electric Company stipulated that the transformers should be included in the rotary convertor order, and it is difficult to explain why the railway company, taking an action of this national importance as a protest against the dictation by a British manufacturer, should have agreed to the dictation of a foreign manufacturer regarding the addition of the transformers to the rotary convertor equipment, as a condition of the contract.

If the answer of the railway company is that they were not dictated to by the Swedish Company to this extent and placed the contract for the transformers abroad of their own free will, then their action is inexplicable.

It is beyond question that before the contract was placed, two contractors did offer to furnish the whole of the machines and transformers required in the time specified. The stated cause of the railway company's grievance against certain manufacturers was that they were endeavouring to dictate to them; if this is true, it only concerned three firms. Three other British contractors had never been asked to tender at all, and one of them—the Metropolitan-Vickers Electrical Co., Ltd.—had on several occasions, from the beginning of February until the middle of April, asked to be allowed to quote for the contract and also to undertake the whole of the order, while Messrs. Mather & Platt and Messrs. Bruce Peebles, both well-known makers of rotary plant, were not given an opportunity of making a bid. Several other firms who specialise in the manufacture of transformers, an ancillary part of converting equipment, were neither asked to quote, nor had they done anything in any way to give offence to the railway company.

Another alleged reason given by the railway company for placing the contract abroad was the existence in this country of price maintenance agreements.

It is a matter of common knowledge that practically every trade in some form or another is subject to price control, and the railways themselves have adopted a similar procedure in regard to the fixing of fares and rates.

It should be clearly understood that electrical manufacturers have never made any secret of their organisation, which has as its object the securing of fair prices for their products. Prior to the war, the electrical engineering industry lost money heavily through unrestricted competition, which not only prevented development of new apparatus, but resulted in an unbalanced condition of the various works, and this reacted upon the employment of the workpeople engaged in the industry. The conditions of the war forced the electrical industry to collaborate with their workpeople in an endeavour to provide for a more equal distribution of work throughout the country.

The balance sheets of the various companies since the war have shown an improvement, but both the wages of the skilled workmen, and the dividends to the shareholders are only modest figures when the highly technical nature and the national importance of the industry is considered.

It is important to remember that as a result of better organisation and co-operation of the industry, developments in research work have made rapid strides during the last 10 years, and the effect of this development is apparent in the building up of a high class of product which has enabled Great Britain to secure her share of business in the export field.

In any case, when a matter of such national importance was at stake, would it be unreasonable to ask the management of a great British railway, before placing a contract abroad, to acquaint the responsible heads of the industry of its grievance against them and its consequences? On the other hand, it is, unfortunately, necessary to state that the negotiations which resulted in the placing of the contract

abroad were carried out with the utmost secrecy, and the fact that the railway company's engineer was visiting Sweden became known to the British tenderers as a result of the merest accident. In fact, the first news which any of the tenderers received concerning this contract was a statement that it had gone abroad, published in the morning newspapers.

The statement issued by the Southern Railway Company has done incalculable harm to British industry. It was either true or untrue, and nothing but an admission by the Southern Railway Company that the facts stated above are true will effectively remove the wrong impression which has been created.

It would not be politic to suggest that the facts as given to the public were deliberately untrue, but if an honest mistake has been made, and in view of the serious result of such a mistake, the railway company should need no persuading to correct the false impression that exists.

The heads of the railway company have invariably been accessible to the chairmen of the larger electrical contracting companies, and it is without question that had two or three of them been called together by the railway company, the facts would have been cleared up and the contract would have been kept inside this country.

To our members we would say that whatever was the direct loss in wages resulting from this contract leaving the country, and the sum was a very large one, the repercussion of this unwise step by a British railway company is being felt in every part of the world. To our certain knowledge, the Swedes have flashed the news of this set-back to British industry to every one of our Overseas Dominions. The trade lives, roughly, on 50 per cent. of business at home and 50 per cent. abroad. Many people who have always bought British machinery because they were either too patriotic to do otherwise, or feared the consequences of such a step from a technical point of view, will, as each tender is received, be prone to follow the lead of the Southern Railway.

A Croydon Wiring Scheme.

Electricity Committee's Proposals Rejected.

THE Croydon Electricity Committee, upon the suggestion of the borough electrical engineer (Mr. A. C. Cramb), recently drew up schemes for the hire-purchase of apparatus and installations. In the case of apparatus it was proposed to give a discount to any contractor introducing business, and to also give him the necessary installation work. The payment was to be made by the consumer in eight quarterly instalments of the list price, plus interest. It was proposed that installation work should be carried out by local registered contractors in accordance with a specification provisionally agreed with the contractors. The installations were to be limited to small and medium-sized premises and complete down to the lampholder. The purchase price, spread over five years, was to be the amount paid to the contractor plus 10 per cent. and interest. The householder was to be held responsible for maintenance apart from defective material and workmanship, and the scheme was only to apply to houses in roads in which an electric main was laid.

The following schedule of payments to contractors was embodied in the proposals:—

Schedule of Prices.

	£	s.	d.
Lighting—			
Per point (pendant or 5-A lighting plug)	1	2	0
Extras—			
Two-way switching, per point	1	2	0
Double switching, per point	0	9	6
Chased drops with flush switches ... ... each	0	10	0
Ditto, with surface switches ... ... each	0	6	0
Ironing plug point with switch plug	1	2	0
Heating—			
Per point for separately wired circuits	2	2	0
Per point when looped in pairs on same floor level	1	12	3
Cooking—			
Wiring up to 15 ft. with 30-A i.c. fuses, earth wire and fixing control board supplied by Corporation	2	10	0
Extra—			
Per yard run	0	3	0

The proposals came before the Croydon Council at a recent meeting, and they were referred back by 23 votes to 22. The *Croydon Advertiser* reports that the reference back was proposed by Councillor Gibson, who declared that the chairman of the Electricity Committee (Ald. Robarts) had stated that the Council did not intend to go beyond the wiring of houses, and now further powers were sought. Councillor Muggeridge said that the trade would be sorry if the scheme was rejected, but Councillor Gibson contradicted him and read a letter from the chairman of the local branch of the Electrical Contractors' Association, dated December 6th last, stating that the Croydon electrical contractors were not in favour of the Department's making use of the new Act to carry out electric wiring. Not a single contractor wanted the Department to have selling powers. Councillor Turner said that the sale of fittings would increase, and the business would gradually be lost to the private traders. Councillor Regan urged that the great mass of householders, who were also ratepayers, should not be forgotten. Everything possible should be done to extend electricity to small homes, even if only from the point of view of health. Councillor Morland said that there was to be no municipal trading; the work would be carried out by local contractors. Councillor Chamberlain pointed out, however, that the word "apparatus" was used, the said apparatus eventually to become the property of the hirer. That meant the sale of apparatus. Alderman Robarts said that there were to be no cash sales at all. Councillor Morland said then he understood that all the Committee proposed to do was to stand between the public and the contractors; to arrange sales, receive the money, and pay it over to the contractors. The Town Clerk, asked for a fair interpretation of the contract, said that the scheme authorised the sale of fittings by the hire-purchase system extending over two years. There was no other way. The apparatus would be exhibited in the showroom of the department and would be the property of the department until paid for. If the sale took place through a contractor he would get a commission. In any case the contractor would be employed to fit the apparatus up. The apparatus would be bought by the Corporation, would be exhibited at the Corporation showroom and payments for it would be made to the Corporation. Councillor Pelton maintained that that was municipal trading. As stated, the scheme was referred back to the Committee.

Legal.

Economic Guaranteed Lamp Co. v. Colchester.

IN the Mayor's and City of London Court, before Mr. Registrar Dell, on June 30th, a claim was made by the Economic Guaranteed Electric Lamp Co., 39, Furnival Street, E.C.4, against Mr. G. A. Colchester, 33, Tavistock Road, Bedford, for 19s. for electric lamps supplied. The plaintiffs' representative said that defendant had returned the lamps in question, stating that they were not up to sample, but after they were tested by the plaintiffs and found to be in order, they were again sent to the defendant.

The defendant said that the plaintiffs' representative showed him a 60-W lamp, and compared it with a 100-W lamp that was in defendant's shop. The lamp shown by the plaintiffs' representative gave a better light. He also showed him some 60-W lamps which gave a good light. Defendant gave an order for one 100-W and six 60-W lamps. He found the lamps to be nothing like those the traveller had shown him. He returned them to the plaintiffs, telling them that the lamps were not as represented, and that he did not want them.

The REGISTRAR said that the plaintiffs could maintain that the goods were up to sample, but when they came to Court they must prove their case, and they had not done so. He gave judgment for the defendant, and awarded him 15s. expenses.

La Radiotechnique v. Norton Wireless Co.

IN the Court of Appeal, before the Master of the Rolls and Lords Justices Scrutton and Sargant, on June 27th, the case of La Radiotechnique against the Norton Wireless Co., Ltd., was heard on the appeal of the defendants from the judgment of Mr. Justice Eve in the Chancery Division granting an injunction restraining the defendants until the trial of the action or further order from selling radio valves in cartons bearing the words "Radio Micro," which constituted the plaintiffs' trade mark, or from selling valves in such manner as to pass them off as of the plaintiffs' manufacture.

Mr. Grant, K.C., and Mr. Coombe appeared for the appellants, and Sir Duncan Kerly, K.C., and Mr. Courtney Terrell for the respondents.

Mr. GRANT, for the appellant, said that since the motion was before Mr. Justice Eve, inquiries had been pursued into the matter, and the defendants had now filed evidence which, at any rate for the purpose of the motion before the Court, entirely disposed of the suggestion that the plaintiffs could on an interlocutory application claim any monopoly in the use of the words "Radio Micro."

Sir DUNCAN KERLY, intervening, said that in view of the mass of evidence which had been filed and a most important document which had been shown to him that morning, he did not think he could ask the Court to discuss the question whether there was at that stage a question to be tried. He submitted that on the evidence before him, Mr. Justice Eve was quite right in his decision. But in the succeeding weeks the defendants had filed further evidence. In the circumstances that evidence and the document which he had mentioned made the order of the judge quite unarguable on an interlocutory application to that Court. He asked, in the circumstances, that the order of Mr. Justice Eve should be set aside and that the costs should be made costs in the cause.

Mr. GRANT said that the writ in the action had been issued without warning. There was a motion pending to commit Mr. Kelly, of the defendant company, in connection with the matter.

The MASTER OF THE ROLLS said the order of Mr. Justice Eve would be set aside so far as it granted the injunction; the costs of the appeal and in the Court below would be costs in the cause.

The case came before Mr. Justice Eve in the Chancery Division on July 1st. His Lordship had on May 13th granted an interim injunction against the defendant company restraining them from passing off valves not of plaintiffs' manufacture as and for the plaintiffs' valves. As reported above, the Court of Appeal discharged the injunction.

Mr. ALEXANDER GRANT, K.C., appearing for the defendants, now moved for an inquiry as to the damages his clients had sustained while the interim injunction was in force.

Mr. COURTNEY TERRELL, for the plaintiffs, opposed the inquiry as being premature, but his Lordship said that the defendants were entitled to it, and he accordingly granted it, but said he would not at present make any order as to payment of any damages which might be found due.

Sir DUNCAN KERLY, K.C., for the plaintiffs, then moved to commit Mr. T. Kelly, managing director of the defendant company, for alleged breach of the injunction while it was in operation. Counsel said that Mr. Kelly or the company merely removed the valves which they were selling from the cartons in which they were contained and exhibited them on posters in the shop.

Mr. GRANT opposed the motion, and his Lordship said he would make no order upon it except that the costs would be costs in the action.

H. W. Sullivan, Ltd., v. Honeyman.

IN the Mayor's and City of London Court, on June 28th, before Mr. Registrar Dell, a claim was made by Messrs. H. W. Sullivan, Ltd., against Mr. V. L. Honeyman, Leytonstone, electrical engineer, for £2 8s., the price of an electric fire ordered and delivered. Plaintiffs' solicitor said the defendant stated that the goods were delivered by the plaintiffs to his customer without his instructions. When he received the plaintiffs' account he obtained the goods and returned them. Mr. V. HILL, an employé of the plaintiffs, said he took an order from the defendant for an electric fire by telephone, and saw that it was executed. The defendant said a cheque would be sent the same night. The fire was returned; it was defective, or defendant would have kept it. Evidence was called by the plaintiffs to show that they never heard from the defendant until he was threatened with a lawsuit. The defendant said that as the plaintiffs had told him they wanted cash with the order and could not deliver within 14 days, no order was given, and another firm carried out the job. To his amazement he afterwards discovered that the plaintiffs had delivered the fire. He got it back from his customer, and in order to try and dispose of it he tested it, but found it defective. The Registrar held that a definite order was placed for the fire. The defendant had admitted that he had tested it, which was inconsistent with his story that he had given no order. Judgment was given for the plaintiffs for the amount claimed, with costs.

Chester Corporation v. T. Nicholls & Co.

THIS action, brought at Chester Assizes by the Chester Corporation, was mentioned in our last issue (p. 43). The Corporation sought to restrain the defendants from using water at a certain water wheel on the River Dee.

After further hearing, Mr. Justice Branson found for the Corporation, stating that it was entitled to a declaration that the defendants could use their sluice for the purpose of producing power in their mills and for reasonable cleansing purposes, but in a manner that did not affect the amount of water which would otherwise pass the sluices at the Corporation's hydro-electric works. He dismissed a counterclaim by the defendants and awarded costs to the plaintiffs.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

The "Electrical Review" Index.

The Index to Vol. C. (for the half-year ended June 30th, 1927) will be published shortly, and we shall be glad to receive the names and addresses of those who require it (free of charge) for binding purposes, or wish to retain it for reference. Application should be made to the Publisher, 4, Ludgate Hill, E.C.

Recent Contracts.

An important contract for the London Power Company has been placed with the Metropolitan-Vickers Electrical Co., Ltd. It covers the supply of two turbo-generator sets which are to be installed at the Deptford West power station. The work will be carried out to the instructions of Dr. S. L. Pearce, O.B.E., engineer-in-chief to the London Power Company. The turbines will be two-cylinder machines of 35,000 kW maximum continuous rating, operating at 1,500 r.p.m. with a steam pressure of 350 lb. per sq. in and total temperature 700 deg. F. They will be arranged with a closed-feed heating and make-up evaporating system. The condensers are to be supplied by Messrs. Richardsons, Westgarth & Co., Ltd. The alternators will be single-unit machines of 43,750-kVA capacity, generating at 6,600 V, 3-phase, 50 cycles. They will be arranged for ventilation on the Metropolitan-Vickers patent closed-circuit system, 70,000 cubic feet of air per minute being circulated for each machine. The circulation will be effected partly by fans on the rotor and partly by a separate fan. The overall length of each set will be approximately 70 ft. Each complete alternator will weigh 133 tons, of which 52 tons is the weight of the rotor. The total weight of each set, including the condenser, will be nearly 500 tons.

A number of sets of this size have already been built by the Metropolitan-Vickers Electrical Company for power stations abroad, including three sets recently completed and now being dispatched for the Tsurumi and Amagasaki power stations in Japan. Three sets of even larger capacity are also being manufactured by the same company, one for the Barton (Manchester) power station and two for export.

Indian Engineering reports that the Indian Copper Corporation, London, has placed with the Fraser & Chalmers Engineering Works (proprietors, the General Electric Co., Ltd.) a comprehensive contract for the manufacture of the complete plant for its Mosaboni mine and smelter, Chota Nagpur. The order includes steam raising and pulverised fuel plant, turbines, mining, smelting, and electrical plant. The value of the contract is about £100,000.

The L.C.C. and Lamp Prices.

The General Purposes Committee of the London County Council reports that it has "drawn the attention of the President of the Board of Trade to the fact that the Council has found it impossible in recent years to obtain competitive tenders for the supply of electric lamps for its various services, owing to the fact that all the firms capable of meeting the Council's requirements quote the same prices and to the same specifications."

Burndept Receiver Appointed.

Mr. Chas. W. Rooke informs us that he was appointed by the Court on June 28th receiver and manager of Burndept Wireless, Ltd. He says:—"It has been stated that the company is ceasing to carry on business. This is incorrect. It is the present intention of the receiver and manager to carry on the business, and his appointment will in no way affect the continued manufacture and supply of all 'Burndept' articles. . . . The factory at Blackheath is being continued as hitherto, and no apprehension need be feared of the possibility of the non-manufacture or lack of supply of all listed apparatus and material."

New French Company.

A company has lately been formed at Chateau-Chinon (Nievre), with a capital of five million francs and the title La Société Electro-Caoutchouc, to manufacture rubber and other insulating material for electrical purposes.

Electrical Power in Industry.

Preliminary Report No. 16 on the 1924 Census of Production (issued as a supplement to the *Board of Trade Journal* for June 30th) deals with the engineering industries. It is shown that the industries as a whole possessed 166,952 kW of generating plant in 1924, as compared with 92,506 kW in 1907. The total capacity of electric motors was 1,013,203 h.p., power for 732,575 h.p. of which was purchased. As stated in a longer article in this issue, the electrical engineering industry had 29,916 kW of generating plant and 158,170 h.p. (power purchased for 111,469 h.p.). In the marine engineering industry in 1924 there was 28,908 kW of generating plant and 228,880 h.p. of electric motors, power for 166,501 h.p. of which was purchased. In the group headed "Prime movers and boilers (other than marine engines and boilers)," there was 34,116 kW of generating plant. The electric motors installed aggregated 181,178 h.p., of which 124,004 h.p. were driven by purchased electricity. The textile machinery branch reported 11,136 kW of generating plant supplying energy to 9,865 h.p. of motors. In addition, 45,513 h.p. of motors were driven by purchased electricity. In the machine tool trade there was 1,032 kW of generating plant and 24,634 h.p. of electric motors (power for 22,813 h.p. purchased). The heating, ventilating and sanitary engineering trades reported generating plant totalling 1,945 kW. The motors installed had a total capacity of 27,774 h.p., power for 25,935 h.p. of which was purchased.

Refrigeration Society's Change of Name.

The British Cold Storage and Ice Association, which was founded in 1900, has changed its title to "The British Association of Refrigeration."

Local Exhibitions.

BUXTON.—Last week the Electricity Department ran an electrical exhibition at the Town Hall, the principal feature of which was an "all-electric home." This was furnished by two local firms, and thoroughly equipped electrically. Miss Bissett (Jackson Electric Stove Co., Ltd.) conducted cooking demonstrations during the week. Councillor Sanders, chairman of the Electricity Committee, presided at the opening ceremony, which was performed by the Mayor (Councillor Goodwin). Mr. Bishop, borough electrical engineer, was also present. The Mayor said that although electricity was now generally recognised as the premier illuminant, its other uses were not so well known, and it was the object of the exhibition to show the Buxton public what electricity could do in the home. Mr. Bishop said that they hoped to demonstrate that a good meal could be cooked electrically at a reasonable cost, although Buxton's charges were not so low as those of some other towns. He showed that increased consumption lowered the cost per kWh, and compared electric cooking with cooking by other methods. Mr. Anstey (Jackson Electric Stove Co., Ltd.) said that in the long run electric cooking was the cheapest way; cookers could be hired from the Electricity Department.

SILSDEN.—Having completed the laying of mains and services in the Urban District Council's area, the Yorkshire Electric Power Co. is holding an electrical exhibition at the Co-operative Hall, Silsden, from July 11th to 23rd.

New Swiss Company.

A company has recently been formed in Neuchatel with the title La Société des Constructions Radio-électrique Orbivox, to manufacture radio sets and apparatus.

Social Events.

The Hackbridge Transformer Sports Club held its annual sports meeting recently. Nearly 2,500 people attended, and there were 100 competitors. The Victor Ludorum Cup was again won jointly by Messrs. J. Rowbotham and A. R. Dean, the Inter-Departmental shield was won by the Hackbridge staff, and the Ladies' Challenge Cup went to Miss C. Benham, who was joint holder last year. The prizes were presented by Mrs. W. W. Hughes, the wife of the managing director of the Hackbridge Electric Construction Co., Ltd.

The employés of the Greenwich Cable Works, Ltd. (including the management) went for their annual outing by char-a-banc to Brighton on June 25th. The party spent seven hours by the sea, and on the way home stopped at the "Jolliffe" for a musical evening.

The annual athletic meeting of the Johnson & Phillips Sports Club was held at the club's ground at Kidbrooke on June 25th. Despite the chilly weather, there was a large number of spectators, who were entertained during the intervals by Callender's Cable Works Band. Some good sport was seen, one of the chief events, the tug-of-war, being won by the paper cable department. Siemens Sports Club carried off the invitation relay race, which was fitting, as the J. & P. team won the similar even at Siemens's sports. After the presentation of prizes by Mrs. H. J. Sheppard, the evening was devoted to dancing.

Members of the Blackburn and district branch of the Electrical Contractors' Association held their annual excursion on June 30th, when they went to Ingleton, Conders Green, and Great Eccleston by motor. Luncheon was served at Ingleton, and a visit was paid to the falls. After tea at Great Eccleston, there was an enjoyable bowling match.

The International Chamber of Commerce.

In his inaugural speech at the annual congress of the International Chamber of Commerce, Sir Alan Anderson mentioned some of the subjects which were to be discussed. First of all he dealt with "trade barriers," and pointed out that these were not only tariffs. It was a shock to find how many and varied the barriers were. While realising the danger of international cartels, he said that all international industrial agreements were not aimed at establishing a world monopoly and dividing trade into fixed percentages.

At a later stage of the proceedings Prof. Gustav Cassell dealt more specifically with trade barriers, and included among them the subject of State assistance to national production in the form of subsidies, export prohibitions, export bounties, import duties, export credits, State insurance against export risk, preferential or discriminatory transport rates or harbour dues, import prohibitions and regulation of imports by a system of licences. Where those advantages were concentrated at one point and the burden spread over a wide field little harm was done, but when the system was extended to embrace the whole economic life of a country the burden far outweighed any advantages gained. In his conclusions, Prof. Cassell recommended a sort of "economic disarmament."

Engineering Wages in Australia.

The Sydney correspondent of *The Times* states that Judge Beeby, in fixing an award in the engineering industry in the Australian Federal Arbitration Court on July 1st, caused something like a sensation by introducing the piecework system, which the unions have resolutely opposed. This is accepted as the thin end of the wedge, and an innovation which may revolutionise speed of production.

Convention of "Exide" Service Men.

The seventh annual convention of "Exide" Service Agents was held at the Hotel Metropole, Brighton, on June 28th and 29th. The organisation is a great success—the attendance at this convention bore unquestionable testimony to that fact. Nearly 50 per cent. of the 600 agents in this country were present, who, during two full days of strenuous business sessions, discussed questions of design, of manufacture, of recharging and delivery services. Such a conference cannot fail to be of benefit to all agents able to attend, and of advantage to the user of storage batteries. The exchange of experience between agents from as far apart as Inverness and Falmouth, and the interchange of ideas between agents and manufacturers, means that the man with a battery needing attention can be sure of obtaining advice and the treatment of his battery dictated by up-to-date practice.

Mr. D. P. Dunne, a director of the Chloride Electrical Storage Co., Ltd., presided at the dinner which was held in the Clarence Rooms of the Hotel Metropole. The rooms were decorated with devices proclaiming the merits of the "Exide" accumulator. The chairman was supported by the Mayor of Brighton (Councillor Richard Major), Councillor H. J. Galliers, Mr. John Christie, and others. Every man present received a combined "Eversharp" pencil and calendar, and every lady a vanity box. Mr. Dunne proposed "The Mayor and Corporation of Brighton," and, among other things, said that they had chosen wisely in holding their convention at Brighton, for it was the largest and best that they had had. The Mayor, in responding, said that the one thing that especially appealed to him was that the Chloride Co. was a British company. Mr. John Roberts, of Manchester, proposed "The Company," and wished the "Exide" battery continued progress. Mr. G. S. Harvey, manager of the Service Department, replied. The final toast was "The Service Agents' Committee," proposed by Mr. Morley, and responded to by Councillor Galliers. After the dinner dancing was indulged in in the winter garden of the hotel.

Wages in the Engineering Industry.

The *Daily Telegraph* Labour Correspondent says that Mr. J. T. Brownlie, the president of the Amalgamated Engineering Union, thinks that the prospect of the acceptance of the employers' offer of 2s. per week increase to plain time workers is good. If the offer is approved, it will apply to about 165,000 workers employed by federated firms. Mr. Brownlie, speaking personally, recommends the acceptance of the offer.

Statistics.

The introduction of the annual Guide to Current Official Statistics, the 1926 volume of which has just been issued by the Permanent Consultative Committee on Official Statistics (H.M. Stationery Office, price 1s. net, post free 1s. 4d., pp. 273), has removed many difficulties that may in the past have stood in the way of those who wished to avail themselves of this source of information. The central feature of the Guide is an index directing the inquirer to the volumes which contain statistics bearing on his subject; it also indicates their scope and degree of detail.

Unemployment.

During the week ended June 20th the number of unemployed again fell below one million. The total was 987,300, as compared with 1,028,730 on June 13th and 1,634,740 on June 21st, 1926 (coal-dispute period).

Trade Announcements.

Mr. J. R. HALLIWELL has resigned his directorship with Messrs. Halliwell & Good, Ltd., Manchester, and has taken up a position as electrical engineer to Messrs. Waring and Gillow, Ltd., Manchester. He will be glad to receive manufacturers' lists and catalogues at 118, Deansgate, Manchester.

As from July 11th the telephone numbers of the London office of the Enfield Cable Works, Ltd., will be Holborn 0591-3.

Messrs. KENT BROS. ELECTRIC WIRE CO. & E. H. PHILLIPS, LTD., of Kew Gardens, Surrey, announce that they have appointed the Sloan Electrical Co., Ltd., 79-85, Hanover Street, Edinburgh, as their representatives for Scotland, in place of Mr. J. Grogan, of Glasgow. They also state that Messrs. Morley & Booth, of Newcastle-on-Tyne, are not now acting as their representatives in the North of England.

The BRITISH FIBROCEMENT WORKS, LTD., has acquired the whole of the shares of the Siluminite Insulator Co., Ltd., Southall. On and after July 25th the works of the Siluminite Company will be transferred to Erith, where, during the last few months, new works have been erected adjoining those of the British Fibrocement Works, Ltd.

The telephone number of HOPKINSON INDUCTION MOTORS is now Chiswick 3202 (two lines).

The address of the BRITISH DRIVER-HARRIS CO., LTD., is now Bank Chambers, 329, High Holborn, W.C.1. Telephone: Chancery 7810.

MESSRS. BULL MOTORS, LTD., Ipswich, have appointed MESSRS. BAXTER & CAUNTER, LTD., 219, Tottenham Court Road, W.1, as their agents for London and Southern and Eastern England from July 1st.

The London and district office of BROOK MOTORS, LTD. (as from yesterday, Thursday), is at Aldwych House, W.C.2. Telephone: Chancery 7192-3; telegrams: "Phasebroo Phone."

The Leeds depôt of the MULLARD WIRELESS SERVICE CO., LTD., is now at 33, York Place. Telephone: Leeds 26360; Telegrams: "Mullard, Leeds."

MESSRS. ENGLAND, VICARY & CO., 13, Herbert Street, Whitworth Park, Manchester, are shortly opening offices in London to develop agencies for electrical goods. They will also act as engineers and contractors, and ask for catalogues and inquiries.

The business of MESSRS. F. J. JONES & CO., electrical engineers, of Eastgate, Chester, has been reorganised. The managing director is Mr. S. Thornton, of Wrexham.

MESSRS. KANSON & CO., LTD., have removed from Wimbledon to 3, Waterloo Road, S.E.1. (Telephone: Waterloo 1565.)

New Catalogues and Lists.

The ARORA CO., Loughborough.—An illustrated and priced leaflet advertising the new "Arora" electric kettle.

The YORKSHIRE ELECTRIC TRANSFORMER CO., LTD., Dewsbury.—A leaflet bearing an illustration of one of the company's 750-kVA transformers showing the method of construction.

The HART ACCUMULATOR CO., LTD., Marshgate Lane, Stratford, E.15.—Lists Nos. 201/1 and 207, dealing, respectively, with "Comparto" and "Rado" h.t. radio batteries. Illustrated and priced.

YESLY ELECTRICAL SUPPLIES, LTD., 5, Iliffe Yard, Crampton Street, S.E.17.—A net trade price list of Mansbridge type condensers. Illustrated and priced.

POPE'S ELECTRIC LAMP CO., LTD., 5, Arthur Street, New Oxford Street, W.C.2.—A July calendar-blotter advertising "Elasta" lamps.

BROOKHIRST SWITCHGEAR, LTD., Northgate Works, Chester.—A folder containing a brief description of the company's "Junior" drum starting panel, and referring to Catalogue No. 10 for fuller information. Also calendar cards for July, August, and September, containing further beautiful architectural drawings.

The LUTH & ROSEN ELECTRICAL CO., LTD., 75, Victoria Street, S.W.1.—A well-illustrated brochure describing the company's flexible helical-geared motors and gear boxes.

MESSRS. SIEMENS BROS. & CO., LTD., Woolwich, S.E.18.—Pamphlet 840a and Leaflet 2,050, describing in some detail "Siemens" electrical thermometers and pyrometers, the latter publication giving examples of their application in many industries.

MESSRS. CROMPTON & CO., LTD., Chelmsford.—Lists No. 82, describing mining electrical plant (winders, pumps, &c.); No. 83 dealing with electrical plant for paper mills; No. 84, dock electrical plant (pumps, cranes, &c.); and No. 85, marine electrical plant (generating sets, pumps, steering gear, &c.).

MESSRS. L. MCMICHAEL, LTD., Wexham Road, Slough.—An illustrated pamphlet advertising the company's 5-valve portable receiving set.

THE CAMBRIDGE INSTRUMENT CO., LTD., 45, Grosvenor Place, S.W.1.—List No. 151, dealing with "Thomas" electrically-operated recording gas meters.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—The "Osram-G.E.C. Bulletin" for June, containing illustrated articles and notes upon "Osram" lighting installations, radio valves and apparatus, refrigerators and domestic appliances.

ELECTRICAL UTILITIES, LTD., Tudor Works, Park Royal, N.W.10.—Leaflet C, giving prices and illustrations of the company's small cookers and cooker radiators.

MESSRS. ELLIOTT BROS (LONDON), LTD., Century Works, Lewisham, S.E.13.—Illustrated pamphlets containing a full description of the "Thomas" averaging recorder for maximum demand, kW or kVA.

THE RELAY AUTOMATIC TELEPHONE CO., LTD., Marconi House, Strand, W.C.2.—A pamphlet, "Through in Three Seconds," advertising the company's automatic telephone system.

Bankruptcy Proceedings.

J. T. NICHOLS, wireless parts merchant, late of 4, Glebe Road, Kingsland Road, E.—The first meeting of creditors was held on June 27th, at Carey Street, W.C. The receiving order was made on the petition of Izzard Bros., wholesale wireless distributors, creditors for £177. From the debtor's statements in his preliminary examination it appears that he began business in 1922, and on January, 1926 he contracted to supply inductance coils to the petitioning creditors. Their business was subsequently converted into Reflex Radio Co., Ltd., and later the company went into liquidation. He was advised that he had a claim against Izzard Bros. for the value of the goods supplied, and brought an action to recover £523, but judgment was given against him; the debt of the petitioning creditors is for the costs of the action, and that is practically the only liability. In April the debtor sold his business to his two sons for £50 on the understanding that it was to be converted into a limited company, he taking the post of secretary. D.X. Coils, Ltd., was registered in April last, and the debtor purchased 200 £1 preference shares, which apparently represents his only asset, the debt due from Reflex Radio Co., Ltd., having been assigned to D.X. Coils, Ltd. The debtor attributes his failure to the loss of the before-mentioned action. The case was left in the hands of the Official Receiver.

G. C. LAZENBY, 29, Old Town Street, Plymouth, wireless engineers.—The first meeting of creditors was held recently at Devonport. The statement of affairs showed liabilities of £1,281 and net assets of £252, leaving a deficiency of £1,029. Debtor attributed his failure to bad trade through strikes and the unsuitability of the broadcasting programmes. He commenced business with stock valued at £200, and £100 capital, £50 of which was borrowed and had since been repaid. In the year ended March 31st, 1925, the sales were £5,886 and the net profit £273. In the following year the net profit was £145 on a turnover of £5,137. Debtor's drawings for the two years were respectively £437 and £371. He stated that he became aware of his financial position about a year ago, but continued trading in the hope of an increase of trade. At the date of the receiving order proceedings had been commenced by two creditors. The creditors decided to appoint Mr. Parkin S. Booth, Kimberley House, Holborn Viaduct, E.C., as trustee of the estate, while a committee of inspection was also nominated.

H. L. SMITH, electrician, 156, Tredegar Road, and lately of 10, Ordell Road, Bow, E.—An application was made to Mr. Registrar Mellor at the London Bankruptcy Court last week for an order of discharge on behalf of this bankrupt, who failed last September. The Official Receiver reported that the estate had realised £28, and a dividend of one halfpenny in the £ had been paid on admitted proofs amounting to £1,548, mainly owing to his father. The bankrupt had admittedly been insolvent since 1919 or 1920, but continued to trade in the hope that business would improve. The failure was attributed to ill-health, bad debts, and loss sustained as the result of a long firm fraud. The offences reported by the Official Receiver were (1) insufficiency of assets to equal 10s. in the £ on the amount of the liabilities; (2) omission to keep proper books of account; and (3) trading with knowledge of insolvency. His Honour granted a discharge subject to a judgment for £10 to be satisfied by an immediate cash payment.

JOSEPHINE R. HEREFORD-LAVEY and VIOLET DE FRECE (trading as Radio Cash Stores), electricians, 371, Upper Street, Islington.—An application was made to Mr. Justice Clauson in the Chancery Division on June 29th arising out of the failure of these debtors. Mr. Tindale Davis, on behalf of the trustee, asked for a declaration that a sum of £272 in the hands of his client was the property of the debtors, and as such was divisible among the creditors One of the debtors was the lessee of certain property, and the trustee entered into a contract to sell the property to a Miss Woolf. The sum in question represented a deposit on the purchase of some property. The time allowed for completion having expired, the deposit was forfeited, and it was now being reclaimed. His Lordship directed the trustee to serve notice by registered post upon the claimants, and he would be in a position to do something of an effective nature.

G. S. HALL, trading as Geoffrey S. Hall & Co., electrical engineer, late of Malden Road, New Malden, also of Cheam and Ewell. The first meeting of creditors was held last week at the London Bankruptcy Court, a receiving order having been made on June 15th upon a creditor's petition. The Official Receiver reported that the debtor had not yet lodged a statement of affairs, but had roughly estimated his liabilities at £590 against assets of £400, consisting as to one-half of book debts and the remainder cash in the hands of the trustee under a deed of assignment. In November, 1920, he

bought for £320 the business of an electrical engineer. He possessed a capital of £60 and the balance was borrowed from a friend and since repaid. In 1924 he opened a branch at Cheam, and later another one at Ewell. In September, 1925, he states, he entered into a verbal agreement with the petitioning creditor under which he was to come into partnership on payment of £500, of which £100 was actually paid. In April last year he sold both of his branches for £230, about half the amount that they had cost him. They had been run at a loss. In January last the petitioning creditor obtained judgment against him, and the debtor executed a deed of assignment. The trustee carried on the business for some time and then closed down. Since April the debtor has been carrying on business on a small scale, only performing work personally and executing small contracts for electrical work. He attributes his failure to losses incurred on his branch business, to loss of trade in consequence of the expiration of a lease, and to lack of capital. The estate was left in the hands of the Official Receiver.

E. M. LANCASTER the younger, 21, Hanover Lane, Leeds, electrical engineer.—The public examination of this debtor was held on June 28th, at the County Court House, Leeds. The statement of affairs showed a deficiency of £416. Debtor attributed his failure to lack of capital and bad trade. He commenced business on his own account with £50 borrowed capital, and worked up a good connection, but he was compelled to borrow a further £400, which was still outstanding. He became aware of his position at the end of last year, but continued in the hope that trade would improve. The examination was closed.

J. SPAVEN, George Street, Bradford, electrical and mechanical engineer.—The first meeting of creditors was held on June 30th, at the Official Receiver's Office, Bradford. The gross liabilities were put down at £569. with a deficiency of £449. The case being a summary one, was left in the hands of the Official Receiver as trustee of the estate.

N. H. PAYNE, electrical and wireless engineer, 4, The Triangle, Teignmouth, and 11, Queen Street, Dawlish.—Last day for proofs for dividend, July 16th. Trustee, Mr. W. R. Cocks, Official Receiver, Exeter Bank Chambers, 67, High Street, Exeter.

D. ROSCOE, electrical engineer, late of 4, North Albion Street, Fleetwood.—Receiving order made June 22nd, on a creditor's petition.

J. EADE (J. Eade & Son), electrical contractor, 48, New Road, Skewen.—Receiving order made June 23rd, on debtor's own petition.

W. A. BARKER and F. G. H. BARKER (Barker Bros.), electrical engineers, 554a, Dudley Road, Wolverhampton.—First meeting held July 5th, at the Official Receiver's office, 30, Lichfield Street, Wolverhampton; public examination, July 20th, at the County Court, Wolverhampton.

A. J. CULLUM, motor and electrical engineer, 8, Church Street, Diss.—Last day for proofs for dividend, July 13th. Trustee, Mr. H. S. Gotelee, Official Receiver, 9, Arcade Street, Ipswich.

F. V. LAMBERT (Lambert & Curley), electrical contractor, 27, Parrock Street, Gravesend.—Last day for proofs for dividend, July 12th. Trustee, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C.

H. BEBBINGTON, electrical engineer, 14, Cestrian Street, Bolton.—First and final dividend of 20s. in the £ and 4 per cent. interest. Payable at the Official Receiver's office, Byrom Street, Manchester.

C. H. KITCHING, plumber and electrical engineer, 172, Beverley Road, and 42, Chariot Street, Kingston-on-Hull.—Supplemental dividend of 7s. 9½d. in the £, payable at the Official Receiver's office, 37, Scale Lane, Hull.

T. E. JONES (B. Jones), electrical engineer, 138, Northgate Street, Chester.—First meeting, July 8th, at the Commercial Hotel, St. Peter's Churchyard, The Cross, Chester. Public examination, July 26th, at the Castle, Chester.

J. J. WHITTAKER, electrical engineer, carrying on business in co-partnership with H. Busfield as Busfield & Co., at 6, Wilfield Street, and 215, Padiham Road, Burnley.—Application for discharge to be heard July 28th at the Court House, Burnley.

W. S. MILES, radio engineer, "Roslyn," Worston Road, Burnham-on-Sea.—Trustee, Mr. F. W. Darby, Official Receiver, 26, Baldwin Street, Bristol, released June 22nd.

H. B. POWELL, wireless dealer, 10, Union Street, Hereford.—Receiving order made June 29th on debtor's own petition.

Dissolutions of Partnership.

"UNIQUE PATENTS," electricians, 388, City Road, E.C.—Mr. H. F. Wheeler and Mr. H. T. Allen have dissolved partnership. Mr. Wheeler will attend to debts and continue the business.

HERBERT BOWYER, 274a, Kentish Town Road, N.W.5.—Messrs. W. J. Bowyer and J. T. Booker have dissolved partnership. Mr. W. J. Bowyer is continuing under the same style and will attend to accounts. Mr. J. T. Booker is to carry on business as an electrical engineer at 59, Spencer Road, N.W.5.

Company Liquidations.

WAREHAM ELECTRIC SUPPLY CO., LTD., 4, Great St. Thomas Apostle, E.C.—A compulsory winding up order having been made in this case on the petition of a shareholder, the statutory first meetings were held on June 30th, at Carey Street, W.C. Mr. H. E. Burgess, Senior Official Receiver, stated that in this case the public had been victimised. No statement of affairs had yet been lodged, and the accounts from May, 1923, were in confusion. The company was incorporated as a private company in October, 1920, for the purpose of carrying on an electricity undertaking in Wareham and district. The original nominal capital was £5,000, and £3,990 was issued. The money was expended in the purchase of one and a half acres of freehold land, a small generating station, two second-hand engines, and on the costs of obtaining an authority from the Electricity Commissioners to supply electricity. Owing to lack of capital, the works were not completed, and in 1922 the company went into voluntary liquidation. Then Col. Edmund O. Eaton, acting through an agent, Mr. J. G. Royce, purchased the undertaking for £1,400. The shareholders received 3s. 5d. in the £ on their holdings, that dividend being regarded as a fair value for what the shares then represented. The original nominal capital was increased, and in June, 1925, stood at £20,000. A new board was created, by which means Col. Eaton was able to control the company and its capital. The qualification of directors was the holding of £50 in shares. None of them qualified; some had shares given to them, but no money passed. Registered offices were opened at Bournemouth, and there were also London offices shared by other concerns—in particular the Electricity Finance Distribution Corporation, Ltd., and the Lighting and Power Finance Corporation, Ltd., which were also controlled by Eaton. In 1923 resolutions were passed to create and issue £5,000 debentures to Mr. Royce or his nominees, in satisfaction of the company's indebtedness to him "in respect of his account for discharging the company's liabilities to the voluntary liquidator, and his disbursements." It would thus be seen that in return for his finding £1,050 Mr. Royce was voted debentures for £5,000, and at the same time resolutions were passed to issue £4,990 preference shares in exchange for surrendering the rights and privileges attaching to the old issued capital of £3,990, such rights having been acquired at 3s. 5d. for each £1 share, or a total of £680. The people who passed the resolutions giving Mr. Royce the debenture were not shareholders, but merely employés and nominees of Col. Eaton. The effect of those irregular transactions was to make available to Col. Eaton and the Electricity Finance and Development Corporation £10,000 debentures and share capital of the company. That capital was offered, sold, and issued to the public by means of prospectuses. The subscriptions to the first prospectus, amounting approximately to £4,315, were received direct by the Electricity Finance and Development Corporation, and became available to Col. Eaton and for other schemes and companies in which he was primarily interested. In the meantime orders were placed by the company for the completion of the mains and plant. The company issued debenture and share certificates direct to the purchasers, and although no transfers were executed, recorded the purchasers in its registers as transferees of part of the £10,000 debenture and preference shares placed in the hands of the Electricity Finance and Development Corporation and the Lighting and Power Finance Corporation. Further prospectuses resulted in applications for £3,286 debentures, £4,730 preference, and 1,525 ordinary shares of 1s. each, the last class being offered and purchased at a premium of 1s. The applications included £1,610 debentures in excess of the company's issue. Up to December 31st, 1923, although £12,545 had been obtained from the public since May, 1923, the company had only received the benefit of £914 expended on plant and machinery. The response to another prospectus issued in February, 1924, was applications for £3,307 preference and 3,867 ordinary shares; the preference shares were offered at par, but the ordinary shares were offered and, in part, issued at a premium of 4s. each. In the following May, although only £800 of the company's capital remained unissued a second offer was sent out which resulted in applications being received for £1,620 preference shares in excess of the company's nominal capital. The applicants were given certificates for shares which did not exist; and the excess subscriptions were paid over to the Electricity Finance and Development Corporation. The accounts for 1924 showed the company's revenue for the supply of electricity at £327; in 1925 it amounted to £825; and for the 16 months ended April 30th, 1927, it was £1,582. Although the preference share capital had been over-subscribed, another prospectus was sent out, and in response subscriptions were received for £600 debentures, £1,340 preference shares, and 1,560 ordinary shilling shares at 10s. per share. The money received for the debentures and preference shares was for the most part handed over to the Electricity Finance and Development Corporation. Later the Electricity Finance and Development Corporation purchased the holdings of certain dissatisfied share and debenture holders, chiefly through an associated concern at a heavy discount. In June, 1925, the nominal capital was increased to £20,000 by the creation of 9,500 8 per cent. cumulative preference shares of £1 each; the company's share register was thereupon amended to cover the excess shareholdings, but the subscriptions which had been paid to the Electricity Finance and Development

Corporation were not returned to the company. The increased capital was offered to the public, who subscribed to £2,859 preference and 980 ordinary shares; the latter were offered at £1 per share, and were over-subscribed to the extent of 183 shares. Those excess subscriptions were not returned to the applicants; the directors again issued certificates for shares which did not exist, and the subscribers would have to be regarded merely as unsecured creditors for £183. Returns had to be made from time to time to Somerset House; in some instances they did not disclose necessary particulars, and in others they were false returns, a fact of which notice would have to be taken in due course. There was one further issue of capital in February, 1926, when £740 preference shares were subscribed. The main reason in the prospectus given for that issue was the installation of hydro-electric plant for reducing the costs of production, but the proceeds were absorbed by the expenses. From March, 1926, until the liquidation the officials were mainly engaged in the staving-off of pressure from creditors and shareholders and the insistent demands from the Electricity Commissioners for production of detailed accounts. The debenture holders had left the Official Receiver to look after the property and realise it for them. The works were being carried on in the hope of selling the property as a going concern. The debentures certainly could not be paid in full, and although the rights of the directors to issue the bonds were open to question, he thought great difficulty would be experienced in trying to have them set aside, because they were now in the hands of innocent people who purchased them for cash. In any case only a very small distribution could be made to the debenture holders, and there was no prospect whatever of any return being made to the unsecured creditors or the shareholders. There was a very considerable book debt due from the Electricity Finance and Development Company, but that company was also in liquidation. The unsecured liabilities included £1,980 due to persons who subscribed for debentures in excess of the company's capital, £183 to ordinary shareholders under similar circumstances, and about £700 to other creditors, whilst the liability on capital was £16,183 in respect of preference, and £683 for ordinary shares at par. Allowing £2,500 for the value of the assets, there was a total deficiency of £27,576.

The chairman stated in conclusion that this appeared to be one of a group of some 30 companies, all of which were under the same control, and three of the number were being wound up. A strict investigation would be made, and in due course he would send a report to the Court. Wilfred Burton, a director, said that he signed forms in ignorance that debentures and shares were being issued in excess of the company's capital. The chairman said that but for directors like Burton, Col. Eaton and his associates could not have carried out their plans. He supposed that Burton would have signed anything put before him. Burton admitted that to have been the case.

The liquidation was left in the hands of the Official Receiver.

H. KAPLAN, LTD., trading as the Elkay Wireless Co., wireless and electrical dealers, Bishopsgate, E.C.—A meeting of creditors was held on July 1st at the offices of Messrs. Lever Bros. & Co., Chiswell House, Finsbury Pavement, E.C. Mr. H. Lever, the liquidator, submitted a statement of affairs which disclosed liabilities of £2,155, all due to unsecured creditors. The assets totalled £1,615, leaving a deficiency of £540. Mr. Burns, solicitor, stated that H. Kaplan, Ltd., was registered in 1924, and took over a business which had previously been carried on under the style of the Elkay Wireless Co. The nominal capital was £5,000, of which £4,000 had been issued. He understood that the shares were allotted for cash. From October 24th, 1923, to March 31st, 1925, there was a net profit of £1,768. During the year to March, 1926, there was a trading loss of £3,820. Figures covering the period to the date of the liquidation disclosed a further loss of £709. The company had retail shops at Bishopsgate and Holborn, and a wholesale establishment at Bishopsgate. In 1925 the Holborn establishment was closed, and in the current year two of the shops in Bishopsgate were closed down. The sales declined continuously during the last two years, and the values of the stock had rapidly depreciated. Mr. Burns added that the Inland Revenue authorities had made a claim on the company which might be satisfied by the payment of £600 or less. The representative of the principal trade creditors stated that he was informed that Mrs. L. Kaplan was still registered as the owner of the Elkay Wireless Co. It might be held that technically the company did not take over the Elkay Wireless Co.'s business. Mr. Houstoun said that Mrs. L. Kaplan was the registered owner of the business, but apparently she was not the vendor to the company. Mr. Stocker said that all the orders for goods were given in the name of the company. Mr. Gardner pointed out that the file of the company at Somerset House showed that only three shares of £1 each were issued for cash, and it was stated that the remaining 3,997 shares were issued for a consideration other than cash. The chairman said that in October, 1923, a balance-sheet was prepared which showed assets of £1,596, and Mr. Kaplan's proportion was taken as being £647, and Mr. M. Cohen's share at £948. Mr. Kaplan paid £1,352 in cash, making the total sum of £2,000, for which shares were allotted to him. Mr. Fingard handed over £1,000 in cash for his shares. Questions were asked regarding the premises, and a resolution was passed approving the liquidation of the company with Mr. Lever and Mr. W. A. J. Osborne, of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C., as joint liquidators. A committee was also nominated consisting of the representatives of Messrs. Zeitlin & Sons, Ltd., and Teabbush & Co., and Mr. C. Latham. The following are creditors:—

	£		£
Zeitin & Sons, Ltd. ...	176	Rooke Bros., Ltd. ...	36
Teabbush & Co.	119	Melbourne Radio Co. ...	35
Becker & Co.	76	Radvaco, Ltd.	34
Rothermel Radio Co. ...	56	Erewash Electric Wire	
Certax, Ltd.	52	Co.	29
Greengate & Irwell Rubber Co.	50	Kalisky, Ltd.	27
Gramophone Co., Ltd.	49	Gottlieb, J. L.	22
Fonteyn, Gilbert & Co.,		Bedford Electric Co. ...	20
Ltd.	46	Sanaphos, Ltd.	428
Danipad Rubber Co. ...	38	Cohen, M.	105
		Lever Bros.	200

WATES BROS., LTD.—The liquidator, Mr. W. B. Anderson, announces the payment of a first dividend of 2s. in the £. He estimates that a further 1s. 3d. in the £ will be available when the remaining assets are realised, subject to collection expenses.

ORION ENGINEERING CO., LTD.—A meeting of creditors is called for July 18th at the offices of the liquidator, Westminster Chambers, 28, East Parade, Leeds.

MAGNETIC SIGNS & CARRIERS, LTD.—A meeting of members is called for July 30th at 18-19, Ironmonger Lane, E.C.2, to hear an account of the winding up from the liquidator, Mr. J. C. Sherrott.

RADIO PHONOPORE & ELECTRICALS, LTD.—Liquidator, Mr. M. C. Spencer, 3, Frederick's Place, Old Jewry, released June 9th.

Private Arrangements.

WHEATLEY, SMITH & CO., LTD., 22, Nightingale Lane, E.11, electrical and radio engineers.—A meeting of creditors was held recently at the offices of Messrs. W. A. Scott & Co., 50, Cannon Street, E.C., when the two directors, Mr. Wheatley and Mr. Smith, were present. They had prepared an approximate statement of affairs which disclosed liabilities of £1,425, of which £1,298 was due to the trade, and there was a bank overdraft of £127, which was guaranteed by the directors. The assets were valued at £778. The company was formed in August, 1925, with a nominal capital of £1,500, to take over a business which had been carried on by Messrs. Wheatley and Smith. The purchase price was £500, which was satisfied by £500 in fully-paid shares. There had also been subscribed £382 at a later date, which was paid for in cash. Considerable amounts had been lost on unprofitable contracts. A short time ago a debenture for £300 was issued in respect of past consideration. The company had no proposals to put forward; it had been unable to hold a meeting of shareholders. Suggestions were put forward that the business should be allowed to continue in the hopes of finding fresh financial support. It was explained that endeavours had been made in that direction, but so far without success. The creditors ultimately resolved to appoint a committee of inspection consisting of the representatives of Messrs. J. J. Eastick & Sons, Falk, Stadelmann & Co., Ltd., the Macintosh Cable Co., Ltd., the British Thomson-Houston Co., Ltd., and one local creditor, the committee to report to the general body of creditors within 14 days, and the directors to meet the committee within a week to put forward a definite proposal. Two creditors who had issued writs agreed to hold the matter over until the committee had been able to report.

H. JONES, 1a, Marlborough Road, Tuebrook, Liverpool, electrical engineer.—A meeting of creditors was held recently, at the offices of Messrs. R. Duncan French & Co., Liverpool, when a statement of affairs was submitted which disclosed liabilities of £398. The net assets were £444. The debtor commenced in business seven years ago on his own account. Full details of the trading were not available, but it was stated that the takings had averaged between £40 and £50 monthly. Legal proceedings had been taken against the debtor, and in order to protect the estate a deed of assignment had been executed in favour of Mr. R. D. French as trustee. It was resolved to confirm the deed of assignment, and to appoint a committee of inspection, consisting of representatives of Messrs. Baxendale Bros., Ltd., the Walsall Hardware Co., and the English Cable Supplies. The following are creditors:—

	£		£
General Electric Co., Ltd.	23	Baxendale Bros., Ltd. ...	100
W. T. Henley's Telegraph Works Co., Ltd.	35	Walsall Hardware Co., Ltd.	57
English Cable Supplies, Ltd.	64	Rowe Bros., Ltd.	27

A. E. HUMPHREYS, 20, St. James's Square, S.W.1, electrical engineer and contractor.—A meeting of creditors was held on June 13th, when it was decided that the matter should be adjourned for the submission of a scheme for the continuation of the business. At the resumption of the meeting on June 28th at Essex Hall, Strand, W.C., a scheme was presented providing that a committee consisting of three of the creditors should be appointed as inspectors and trustees.

The scheme also provided that the debtor should be at liberty to carry on the business subject to the inspectors' control, and that the present contracts should be continued. It was also proposed that efforts should be made to secure additional contracts. The creditors approved the scheme in principle, and appointed the representatives of Messrs. W. White & Co., and Electrical Conduits, Ltd., inspectors with power to co-opt.

Trade Prospects in China.

According to the Manchester *Daily Dispatch*, Mr. Sterling Fessenden, chairman of the Shanghai Municipal Council, considers that there is scant hope of settled government in China for years to come. He says, however, that the anti-foreign attitude is waning, and that the country is on the eve of a trade revival which will greatly benefit British interests.

For Sale.

The Controller of Supplies, H.M. Office of Works, invites offers for electrical equipment, including generators, motors, and starters, fans, &c. Fleetwood Urban District Council Electricity Department has for disposal one 240-cell Tudor battery. Worcester Corporation Electricity Department has for disposal several thousand second-hand metal filament, &c., &c., lamps. (See our advertisement pages to-day.)

Book Notices.

The issue of the *American Machinist* for June 25th is the fiftieth anniversary number, and is devoted to a review of the progress made in the machine-tool industry during the past half-century. Some forty short signed articles by authorities in their respective spheres are included—15 of these in the European edition being by British writers—and numerous illustrations are given, both of machines and of men. The issue comprises 116 pages of text, and is an admirable production.

The *Henley Telegraph*, a staff magazine, the appearance of which has not been possible for some time past, has resumed publication with the June issue, and it will arrive regularly every quarter in future. In the course of more than fifty pages a vast quantity of interesting material appears regarding staff appointments and other movements, the athletic, dramatic and social activities, the presentation made to Sir George Sutton, Bart., in December last, and many other matters of domestic interest to all connected with W. T. Henley's Telegraph Works Co. We congratulate the editor upon the homely, human and humorous touch.

"Elementary Electrical Engineering," by A. E. Clayton and H. J. Shelley. Pp. ix+410; figs. 274. London: Longmans, Green & Co., Ltd. Price 7s. 6d. net.

"Business Forecasting and its Practical Application," by W. Wallace. Pp. xiv+117; figs. 17. London: Sir Isaac Pitman & Sons, Ltd. Price 7s. 6d. net.

"Lectures on Dielectric Theory and Insulation," by J. B. Whitehead. Pp. xii+154; figs. 61. Price 12s. 6d.; "Inventions and Patents: Their Development and Promotion," by M. Wright. Pp. vii+225. Price 12s. 6d. "The Fourth Power-Kink Book," being extracts from recent issues of *Power*. Pp. vii+232; illustrated. Price 7s. 6d. London: McGraw-Hill Publishing Co., Ltd.

Prices of Raw Materials.

Messrs. F. Smith & Co. report, July 5th:—Copper (electrolytic) bars, £60, 5s. decrease; do., do. sheets, no change; do. do. wire rods, £70, 5s. dec.; do. do H.C. wire, no change.

Messrs. James & Shakespeare report, July 5th:—No change in the prices of copper bars (best selected), sheet and rod; English pig lead, £24 5s., 35s. dec.

Messrs. Edward Till & Co. report, July 5th:—India-rubber, Para fine, 1s. 4½d., ½d. dec.

In their letter dated July 2nd, Messrs. James Forster & Co. stated that closing prices for lead on July 1st were £23 10s. for July, and £23 17s. 6d. for October, a fall on the week of 18s. 9d. and 16s. 3d. per ton respectively. £23 10s. was the lowest price since 1922. The fall was surprising, as there had been a distinct improvement in demand from consumers, whereas arrivals had been light, and spot supplies, apart from warehouse stocks, none too plentiful. Part of the fall, however, was accounted for by considerable realising of speculative holdings. There were indications of a slightly better consumption in this country and on the Continent, but against this was set a decline in consumption in the United States. World production showed a falling off as compared with previous months.

Lighting and Power Notes.

Ashbourne (Derbyshire).—ELECTRICITY SUPPLY.—The Urban District Council has applied to the Derbyshire and Nottinghamshire Electric Power Co., asking for its proposals for supplying electricity in the district, and also its approximate charge for power purposes.

Ashford (Kent).—LOAN.—The Urban District Council is applying for sanction to a loan of £12,450 for electricity purposes.

Basingstoke.—ELECTRICITY IN SMALL HOUSES.—The Town Council has decided to supply electric cookers and other apparatus to the Council houses in Hackwood Road, and is to apply for sanction to a loan of £1,039 for the necessary cable and services. It has also decided to introduce a hire-purchase and hiring system for the whole of the town.

Beckenham.—ELECTRICITY IN SMALL HOUSES.—The Urban District Council has decided to supply electricity for lighting and cooking to 60 houses being constructed at Elmers End. One of the new houses is to be temporarily used for electricity demonstration purposes.

Bexhill.—YEAR'S WORKING.—The statement of accounts of the Corporation electricity undertaking for the year ended March 31st last, shows a gross profit for the year of £13,035, as against £12,340 in the previous year. After making provision for loan repayments, sinking fund and income tax, the net profit on the year's working was £3,648, as compared with £3,143 in the previous year. A sum of £3,000 from the balance in hand on the revenue account is to be utilised for the purchase of meters or other capital expenditure.

Briercliffe.—ELECTRICITY SUPPLY.—The Burnley Rural Council has considered terms offered by the Burnley and Nelson Corporations for the supply of electricity to Briercliffe. It was stated that Nelson Corporation would take immediate steps to supply electricity at the rates chargeable to its own consumers, but Burnley Corporation required a guarantee of 250 consumers in the district. It was decided to accept the terms of the Nelson authority, and to support its application for an Order authorising the supply.

Bromley (Kent).—SUPPLY TO HOUSING ESTATE.—The Town Council has decided to extend the cable to supply 140 houses to be erected on the Bromley Park Garden Estate at an estimated cost of £833, and to augment the supply to the estate by laying a 3,000-V cable from the works, and erecting a sub-station, at an estimated cost of £1,600.

Canada.—TORONTO.—The sixteenth annual report upon the Toronto hydro-electric system covering the year 1926 shows a total revenue of $9,670,434, as compared with $8,827,373 in the preceding year. Working expenses amounted to $7,130,993, as against $6,305,984, leaving a gross surplus of $2,539,441 ($2,521,388). Interest, depreciation, taxes, sinking funds, &c. contributions absorbed $2,462,033, resulting in a net profit of $11,408 ($81,382), which, as in previous years, was carried to reserve for the stabilisation of the rates. The sales of electrical energy increased from 512,784,492 to 550,270,972 kWh, and the connected load from 584,182 to 640,237 h.p. The maximum supply demanded rose from 194,572 to 220,676 h.p. New plant installed at the various sub-stations included nine 1,000-kW and nine 500-kW transformers, and nine 60-kVA regulators. The length of underground cable laid during the year amounted to 106,161 ft. The total industrial heating and cooking load of the system now totals 12,000 h.p., and brings in an annual revenue of approximately $250,000.

Clitheroe.—EXTENSION OF SUPPLY.—The Town Council is to apply for a Special Order to supply electricity to the villages of Waddington, West Bradford, Grindleton, and Sawley. The prospective charges are 10d. per kWh for lighting, and 3d. per kWh for power.

Continental.—RUSSIA.—The opening of the Zemo-Avchalskaya electric power station on June 26th marked the first step towards the electrification of the western part of Trans-Caucasia. This scheme will greatly assist in the solution of the problem of developing industry and transport in the region, especially the Chiaturski manganese industry (the largest in the Soviet Union), the Tkvibulski coal fields, and the future paper and cement industries. One of the chief users of electrical power is the Trans-Caucasian railway, on which the electrification of the Suramski hills section has already commenced. According to the original project, the station was to have a capacity of 7,000 kW, but in 1923 the project was revised, and the initial power fixed at 12,000 kW. The proposed extension of the station to 28,000 kW would cost about £200,000. The total cost of the station will be £2,000,000.—*Reuter's Trade Service* (Moscow).

SPAIN.—A new hydro-electric power station has recently been put into commission by the Compania Sevillana de Electricidad on the River Ribera de Cala at Ronquillo. When fully completed the plant will comprise three 4,000-h.p. sets, but at present only one set has been installed. Seven power transmission lines have been erected to transmit power to the city of Seville and other places in the province of Huelva

Coventry.—LOANS.—The Electricity Committee has recommended that application be made for sanction to loans of £208,000 in connection with the generating station at Longford, and £5,100 for mains extensions.

Dover.—YEAR'S WORKING.—The chief clerk recently submitted to the Electricity Committee a statement with regard to (1) capital account, showing the net debt of the undertaking on March 31st last to be £165,208; (2) revenue account, showing the net profit for the year ended March 31st last to be £362, which, with the balance of £2,602 brought forward

from the previous year, makes a total net profit to date of £2,964, of which £1,000 has been set aside for depreciation of investments and the surplus of £1,964 carried forward to next year; and (3) the number of kWh sold, revenue derived, and expenditure incurred during the year showing a net profit of .03d. per kWh, compared with .72d. for the year ended March 31st, 1926.

Dundee.—LOAN SANCTIONED.—At a recent meeting of the Corporation Electricity Committee it was intimated that the Electricity Commissioners had sanctioned the borrowing of £24,910 for electricity purposes.

El Salvador.—ELECTRICAL DEVELOPMENT.—The Municipality of Antiguo Cuscatlán has concluded a contract with the local electric lighting company of San Salvador, for an electrical installation. Tenders from abroad will be invited for plant and machinery.—*Reuter's Trade Service* (San Salvador).

Ipswich.—YEAR'S WORKING.—The report of the borough electrical engineer (Mr. A. S. Black) on the working of the Corporation electricity undertaking for the year ended March 31st last shows a total revenue of £133,333, as compared with £105,804 in the preceding year. The coal dispute was largely responsible for an increase in the working expenses, from £57,516 to £80,720, and the net profit was therefore £52,613 (£48,288). Capital charges absorbed £15,957, and there was a net surplus of £36,657, as compared with £34,539 in 1925-26. The capital expenditure during the year amounted to £77,051, the chief items being £30,252 for machinery and £34,013 for mains. The sales of electrical energy increased from 9,478,876 to 11,907,358 kWh, and the maximum supply demanded from 6,580 to 7,300 kW.

Kingussie.—ELECTRICITY AGREEMENT.—The Town Council has approved an agreement with the Grampian Electricity Supply Co., for a supply of electricity to the town.

Lincoln.—YEAR'S WORKING.—The report of Mr. S. Clegg, city electrical engineer, on the working of the electricity undertaking for the year ended March 31st last records a total revenue of £108,829, as compared with £86,277 in the preceding year. Working expenses increased from £44,876 to £65,324, as a result of the coal dispute, and the gross profit was therefore £43,505 (£41,401), to which was added a balance of £832 from the previous year, and an unemployment grant of £220, making a total of £44,556 available. Capital charges, however, amounted to £46,256, and there was a net deficit of £1,699. The capital expenditure during the year amounted to £17,858, the main item being £11,425 for mains and services. The sales of electrical energy increased from 17,217,562 to 17,342,914 kWh, the consumption for private lighting showing an increase of 24.7 per cent.

Maryport.—ELECTRICITY SUPPLY.—The Allerdale Coal Co. has offered to supply electricity at a price not exceeding 7d. per kWh for lighting purposes. Consideration of the offer has been deferred by the Urban District Council pending the receipt of a copy of the company's draft Order.

New Zealand.—WAITAKI RIVER HYDRO-ELECTRIC SCHEME.—The New Zealand Public Works Department has been investigating the possibilities of a new hydro-electric development for general power supply in the south island, and has decided that the best results will probably be obtained by utilising the Waitaki river. According to the *Electrical Engineer of Australia and New Zealand*, the basin of the river contains many possible sites for power development: high level storages exist in Lakes Tekapo, Pukaki and Ohau, and there are several gorges along the lower reaches of the river where power could be developed. It is estimated that an aggregate of possibly 1,000,000 h.p. is available. The best source of supply is a few miles above Kurow, where a dam could be built across the river and a power station erected. At this site 100,000 h.p. could be developed. It is estimated that by 1940 the demand in various parts of the south island will total 87,000 h.p., which is 51,000 h.p. in excess of the present capacity of the Lake Coleridge power station. The Lake Coleridge station can be extended by the installation of a 10,000-kW unit, but it will certainly be necessary to make preparations for the further development. If the new scheme is undertaken it will take at least three years to put the initial installation in operation.

Preesall.—INAUGURATION OF SUPPLY.—On July 1st the chairman of the Urban District Council started up the new generating set installed by United Alkali Co. at Preesall Salt Mines, which will provide the district with an electricity supply. Councillor R. D. Blackmore, the consulting electrical engineer, said his estimate of £14,000 was ample. There were 261 consumers, but the amount of electricity used fell much below his estimate.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

FAVERSHAM.—Lighting: From 9½d. to 8½d. per kWh. Power: A reduction of ½d. per kWh to consumers of between 20,000 and 50,000 kWh per annum.

HINCKLEY AND COALVILLE.—*Leicestershire and Warwickshire Electric Power Co.*—Lighting: A reduction of 1d. per kWh.

CROYDON.—"All-in" and power tariffs: From 1d. to ½d. per kWh.

ILFORD.—The 10 per cent. surcharge imposed owing to the coal dispute has been removed.

THORNTON-LE-FYLDE.—A reduction of ½d. per kWh.

BACUP AND RAWTENSTALL.—Lighting: A reduction of ½d. per kWh. The charge for power has also been reduced.

SHEFFIELD.—Assisted wiring scheme: the inclusive charge is reduced from 7.8d. to 6d. per kWh.

SOUTHPORT. — Lighting: Flat rate from 5½d. to 4½d. per kWh; maximum demand rate from 7d. to 6d. per kWh for the first 365 kWh per kW of maximum demand per annum, and from 2d. to 1½d. per kWh for all energy in excess of this amount. Inclusive domestic tariff: the "unit" charge reduced from 1d. to ½d. during the winter quarters, and the minimum charge reduced from 10s. to 7s. 6d. per quarter.

Salford.—NEW PLANT.—The city electrical engineer has submitted a report to the Electricity Committee on proposed additions to the plant at Agecroft power station to meet the anticipated future demands. The capacity of the plant at present installed is 37,500 kW, and the engineer recommends the installation of an additional set of from 15,000 to 20,000 kW at an estimated cost of £150,000. The committee has recommended that application be made for sanction to a loan to cover the cost of the scheme, which is subject to the approval of the South-East Lancashire Electricity Advisory Board.

Shipley.—YEAR'S WORKING.—The accounts of the electricity undertaking for the year ended March 31st last were submitted at a recent meeting of the Electricity Committee, and showed a loss on the year's working of £5,430, due to the high cost of coal, the increase amounting to £6,413. At the commencement of the year the reserve in hand was £1,836, and after applying this to reducing the loss during the year, the deficiency carried forward was £3,593. Apart from the increased charge to power consumers under the coal clause, amounting to £1,300 for the year, no increases have been made in the charges for electricity.

South Africa.—SIMONSTOWN.—The ratepayers have approved the proposal that the Capetown Municipality take over the electricity undertaking for £10,000 and supply them individually with electrical energy. The date of taking over is provisionally agreed as December 31st, 1927, and the Council's Electricity Department is making arrangements accordingly.—*South African Engineer.*

Southend-on-Sea.—LOANS.—The Town Council has applied for sanction to loans of £12,000 for mains and £12,000 for services.

South Normanton (Derbyshire).—STREET LIGHTING.—The local Council has decided to enter into an agreement with the Derbyshire and Nottinghamshire Electric Power Co. for the supply of electricity for street lighting at a cost of £150 per annum.

Southport.—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer: Mr. E. Moxon) for the year ended March 31st last shows a total income of £104,741, as compared with £91,518. Working costs increased from £46,570 to £56,380, the increased cost of coal amounting to approximately £7,000. The gross profit was £48,361, as against £44,948, to which was added interest of £132 on the hire purchase of domestic appliances, making a total of £48,493. After providing for capital charges, there was a net surplus of £18,342 (£17,104), of which £3,087 was contributed to the borough fund. The capital expenditure during the year amounted to £43,137, and included £23,750 for mains and services. The electrical energy sold increased from 7,079,539 to 8,768,902 kWh, and the maximum supply demanded from 4,140 to 4,938 kW. The average price obtained per kWh fell from 2.81d. to 2.47d. A new boiler house containing two boilers was put into service during the year, and sanction was received to the installation of an additional 6,000-kW turbo-generator, together with water-cooling towers, and one water-tube boiler.

Special Orders.—Applications have been made to the Electricity Commissioners for Special Orders by the Faringdon Electricity Supply Co., Ltd., authorising it to supply electricity in the parish of Great Faringdon, the Northallerton Electric Light and Power Co., Ltd., to supply in the urban district of Northallerton and the parish of Romanby, and the Wigan Corporation to extend its area of electricity supply so as to include the urban districts of Billinge-and-Winstanley and Orrell.

The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising Robert Dunning to supply electricity in parts of the rural districts of Midhurst and Westhampnett; the Whitchurch and Pangbourne Electric Supply Co., Ltd., to supply in part of the rural district of Bradfield; the Barnoelswick Urban District Council to supply in its area; the Urban District Council of Earby within its area; and the Sutton Coldfield Corporation to supply electricity in parts of the rural districts of Walsall and Lichfield.

Sunderland.—INAUGURATION OF PLANT.—Sir John Snell, Chairman of the Electricity Commission, has accepted an invitation to formally inaugurate the Corporation Electricity Department's new plant on August 24th.

Tynemouth.—ELECTRICITY SUPPLY.—At a recent meeting of the Corporation Electricity Committee, the electrical engineer reported that the Tyne Commissioners were not prepared to accept the terms offered them in December last for a supply of electricity. The Committee decided to provide

a supply on the terms agreed by the Sub-Committee at an interview with the Commissioners; that the Newcastle Electric Supply Co. be authorised to take over the existing cable at a cost of £2,000, and that the Commissioners be not required to pay the agreed percentage on this item; that plenary power be given for obtaining the following plant in connection with the supply, *viz.*: two Merz-Price overload feeder panels; one metering panel; two overload feeder panels; one skeleton panel; and that the electrical engineer be authorised to proceed with the erection of the necessary sub-station building.

ELECTRICITY EXTENSIONS.—The Corporation Electricity Committee has authorised the following mains extensions:—Sunniside Estate, Balkwell (£1,200); Ogle Terrace, Balkwell (£500); Brightman Road (£90); and Grosvenor Place (£100).

Welshpool.—ELECTRICITY SUPPLY.—The Town Council is negotiating an agreement with Messrs. E. O. Jones & Sons, Ltd., for a supply of electricity to the town, which is hoped to be available during next winter. A compromise has been arranged with regard to the use of overhead cables, the Council having consented to the use of such lines in certain portions of the town for a period of five years.

Tramway and Railway Notes.

Australia.—MELBOURNE.—The Melbourne Tramways Board has accepted the tender of the Foundation Co., Ltd., at £78,914 for the conversion of the Richmond cable tram route, passing through Spencer and Flinders streets, Melbourne, and Bridge Road, Richmond, to electric traction. According to the *Electrical Engineer of Australia and New Zealand*, the work involves the removal of 19,040 ft. of double cable track and the laying of permanent way for electric cars in its place, and the laying of 712 ft. of new electric track in Spencer Street. Concrete and stringer construction will be used for the greater portion of the route, and in the city section the road surface will be wood blocked. The Board is erecting the overhead equipment, and will lay the crossings over the other tramways at Market Street and Swanston Street, Melbourne, and Church Street, Richmond. The section in the city from Lonsdale Street, along Spencer Street and Flinders Street to Swanston Street will be dealt with first, and the electric services opened as soon as possible. While the remainder of the route is undergoing conversion, passenger services will be maintained by means of motor 'buses. The whole of the contract is to be finished by October.

Blackburn.—TRAMWAY RECEIPTS.—At a meeting of the Town Council on July 1st, it was stated that at the end of the first fortnight of the recently-instituted cheap fare experiments on the tramway system, which included penny tickets, the receipts showed a decrease of £800, as compared with last year, and there were 3,000 fewer passengers.

Bradford.—FARES.—There is considerable public dissatisfaction, especially on the short distance routes, with the 2d. tramway fares at present on six months' trial (with 1d. short distance fares and nothing higher than 2d.), and the Tramways Committee is giving attention to possibilities of revision at the end of the trial period. A proposal is that the penny stages may be shortened still further and some 1½d. fares instituted for distances of, say, two-thirds the present 2d. sections.

Continental.—SAN MARINO.—An electric railway, the first in the Republic, is shortly to be constructed. The cost of the new electric line is to be jointly borne by the Governments of Italy and San Marino.

HOLLAND.—An electric train service over the whole of the railway line between Amsterdam and Rotterdam was inaugurated on July 1st.

Honduras.—NEW TRAMWAY.—The Government has granted a concession to the Trujillo Railway Company to construct a tramway 10 km. in length from the port of Trujillo to Bonito Oriental to carry passengers and ordinary freight such as lumber, hides and agricultural produce.—*Reuter's Trade Service* (Tegucigalpa).

Ipswich.—YEAR'S WORKING.—The accounts of the Corporation tramway undertaking (manager: Mr. A. S. Black) for the year ended March 31st last record a total revenue of £5,211, as compared with £35,991 in the preceding year. The tramway system was entirely changed over during the year to the railless-car system. Working expenses amounted to £4,685, as against £29,020, leaving a gross profit of £526 (£6,971).

The railless car system showed a total income of £35,327, as compared with £6,159. Operating expenses were £31,117, as against £5,448, leaving a gross profit of £4,209 (£710). This was carried to net revenue account with the gross surplus from the tramway system, making a total of £4,736. From this the following charges had to be met: Interest, £4,962; repayment of loan, &c., £6,202; and there was, therefore, a net deficit of £6,428, as compared with a deficit of £1,150 in 1925-26. The number of passengers carried increased from 6,186,119 (tramcars, 4,835,661) to 6,928,831 (tramcars, 707,881), and the car miles run from 609,053 (tramcars, 493,223) to 800,254 (tramcars 78,991). The average revenue per car mile fell from 16.609d. to 12.157d.

London.—THROUGH-RUNNING AGREEMENT.—The Highways Committee has recommended that the period under the agreement with the Walthamstow Urban District Council for the operation of a tramcar service between Liverpool Street and Chingford Mount be extended until October 23rd next, if necessary. The Committee has also recommended the purchase of one 1,500-kVA transformer for the Greenwich power station at an estimated cost of £1,550.

Portsmouth.—TRACK RENEWALS.—The Corporation Tramways Committee proposes to reconstruct a portion of the tramway track from Portsbridge to Cosham. It is proposed, in order to eliminate the track in the London Road from Portsbridge to Cosham, that the track should be laid on Corporation land to the Horndean Light Railway track and thence to the terminus at Cosham, thus saving considerable sums and making a more efficient service.

Tynemouth.—PARLIAMENTARY BILL.—At a recent meeting of the Corporation the town clerk reported that he had received from the Ministry of Transport an intimation that the confirming Bill in respect of the North and South Shields Light Railway Order would not be introduced into Parliament this session, and that therefore the Bill could not be introduced until the early part of next year.

Telegraph and Telephone Notes.

Argentina. — RADIO CONCESSION. — The Sociedad Radio Argentina recently secured a concession from the Spanish Government for the establishment of a wireless-telegraph service between Spain and Argentina.

Farsan Islands.—WIRELESS FOR OIL PROSPECTORS.—Oil prospectors on a lonely group of islands in the Red Sea are the latest of the world's isolated communities to adopt wireless as a means of communication. These islands, in the Farsan group, are being prospected by the Red Sea Petroleum Company, and are about 400 miles north of Aden and the same distance south-east of Port Sudan, these being the nearest British territories, while the Italian port of Massaua in Erythrea is across the Red Sea about 200 miles away. Through these ports and the large number of ships passing up and down the Red Sea within wireless range, the prospectors will be able to communicate with their headquarters and to link up with main telegraph circuits. The installation will consist of a standard Marconi 1½-kilowatt quenched-spark transmitter, together with emergency gear and receiving apparatus, as used on board ship.

Hungary.—AUTOMATIC TELEPHONY.—Within the next few months 200 automatic telephones will be installed in call boxes in the streets of Budapest. The charge for each communication will be 20 fillers (about 1½d.).—*Reuter* (Budapest).

The Telephone Service.—NEW CONTINENTAL CIRCUIT.—Last week the Postmaster-General announced the opening of a telephone service between this country (both London and the provinces) and the Free City of Danzig.

United States.—RADIO COMMUNICATION ON TRAINS.—Radiophone communication between the engineer in the locomotive cab and a brakeman in the "caboose" of a freight train a mile and a quarter long has been demonstrated satisfactorily by the American General Electric Company. The locomotive and "caboose" had identical equipment, consisting of two antennæ, one for transmitting and the other for receiving, a transmitter operating on a short wave so as not to interfere with regular broadcasting, and a receiving set.—*Reuter's Trade Service* (Schenectady).

Wireless at Sea.—AUTOMATIC ALARM SIGNALS.—The Board of Trade, after consultation with the Postmaster-General, has made new rules relating to wireless telegraphy on ships, mainly in view of the probable early approval of automatic alarm apparatus designed to receive a distress call, and the need for regulating the use of such apparatus. The new rules define the "alarm signal" which is to be used to operate the automatic apparatus, and prescribe the conditions to be complied with by such apparatus. They require class 2 ships, after a certain delay, to fit such apparatus in lieu of carrying "watchers," and give certain relief to other ships fitted with the apparatus. All ships are required to have a clock in the wireless room with a seconds hand, to enable the operator to send the "alarm signal" correctly. The new rules come into force on October 1st next; they are to be provisional to the extent that they may require amendment as the result of decisions at the Washington Radio-telegraph Conference, or at a subsequent conference on safety of life at sea.

Radio Notes.

Australia.—LICENCES.—The total number of wireless receiving licences in force throughout the Commonwealth at the end of April was 206,534, of which 108,732 were held in Victoria, 54,581 in New South Wales, 21,335 in Queensland, 15,736 in South Australia, 3,890 in Western Australia, and 2,259 in Tasmania, says the *Electrical Engineer of Australia and New Zealand*. During the month 2,317 licences were cancelled in Victoria, but 4,968 new ones were issued.

Empire Broadcasting.—PROVISIONAL TESTS.—It is understood that Mr. G. Marcuse has offered to carry out preliminary Empire broadcasting experiments from his well-known station (2NM) at Caterham. The Postmaster-General has provisionally approved of the scheme, which will be purely experimental, with a view to determining whether or not a regular broadcast service to the Dominions can be maintained regularly and efficiently. The wavelengths to be used will be 23 and 33 metres, and the transmitter itself has recently been rebuilt, a new power supply system having been installed, and Marconi rectifying and transmitting valves will be used. It is probable that the experiments will commence on or about August 15th.

Malaya.—NEW BROADCASTING COMPANY.—The *Straits Times* announces that a company is being formed in Ipoh, Perak, for the purpose of broadcasting from Kuala Lumpur. Its capital is to be $4,000,000 (£46,660), and it is estimated that the most modern equipment will cost $135,000 (£15,750). The site at Kuala Lumpur has already been applied for, and the intention is to have daily programmes, so that a considerable income from advertising is anticipated. The upkeep has been estimated at approximately $150,000 (£17,600) per annum. Mr. Leslie Cant is the promoter.

South Africa.—RADIO ACT AMENDMENT.—The intention of the Minister of Posts and Telegraphs to reduce "piracy" is revealed by an important amendment to the Radio Act now before the Union House of Assembly for consideration. According to *World Radio*, it reads:—"Any person who sells, gives, or in any manner whatever supplies any valve, loud-speaker, or telephone receiver for radio to any person who is not a licensed listener shall within seven days after such supply notify the Postmaster-General thereof by written notice, setting out the name and address of the person so supplied. Failure to comply with the provisions of this sub-section shall constitute an offence." Objection is expected to this provision, and it is probable that wireless dealers will be registered, and they will have to record their sales of valves, telephones and loud-speakers.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Acton.—July 18th. Town Council. One vertical two-crank non-compound engine, with 50-kW generator, &c., for the destructor works. (See this issue.)

Ammanford.—Amalgamated Anthracite Collieries, Ltd. Six months' supply of electrical goods. Particulars from Buying Department, Central Offices, Ammanford.

Australia.—MELBOURNE.—August 15th. Postmaster-General's Department. One 55-ton 3-motor-type electrically-operated overhead travelling crane. (A.X. 4727.)*
August 16th. Automatic telephone exchange equipment. (B.X. 3566.)*
August 31st. Victorian Railways. Electric transporter. Particulars from Contractors' Room, Spencer Street.
November 14th. State Electricity Commission of Victoria. Two 10,000-kW back-pressure turbo-generators and accessory plant. (July 1st.) One 40-ton electrically-operated travelling crane.
August 29th. One electrically-operated deep dredger for brown coal. (A.X. 4870.)*
November 21st. Five centrifugal feed pumps.
November 28th. Four h.p. water-tube boilers and accessory plant and steel work for buildings.
SYDNEY.—August 15th. Municipal Council. Generator neutral earthing resistance. (B.X. 3550.)*

Belfast.—July 11th. Ministry of Finance. Electric lighting, power, and bell installation for Stormont Castle, Belfast. Forms of tender from 15, Donegall Square West, Belfast.

Belgium.—BRUSSELS.—July 27th. Belgian Ministry of National Defence, 10, Rue du Meridien, Brussels. 325 metres of light telephone cable and 125 metres of covered ditto. Particulars (Cahier des Charges Special No. 12) for 5 fr., from 15, Rue des Augustins, Brussels.

Blantyre.—The Miners' Welfare Society will shortly invite tenders for an electrical installation in connection with the new Miners' Institute. Messrs. Cowie & Millar, architects, Cleland Road, Wishaw.

Dartford.—July 18th. Electricity Department. Small steam coal for 6 months. (See this issue.)

Dunfermline.—July 11th. Town Council. Electric lighting installation for 52 houses. Schedules from Mr. R. Muir Morton, burgh engineer, City Chambers, Dunfermline.

Erith.—July 20th. Electricity Department. Three 50-kVA transformers. (See this issue.)

Hetton-le-Hole.—July 12th. Urban District Council. Overhead mains, lamps and fittings for street lighting by electricity within the district. Particulars from Mr. G. Young, Clerk to the Council, Council Chambers, Hetton-le-Hole.

Ilford.—July 12th. Electricity Department. Two transformer kiosks including transformers and switchgear, &c., and one switch kiosk, including switchgear. (July 1st.)

India.—July 22nd. South Indian Railway Co., Ltd. Electric overhead travelling cranes, electric walking cranes. Specifications from the company's offices, 91, Petty France, Westminster, S.W.

Kilmarnock.—July 13th. Town Council. Electric lighting of 40 temporary dwellings. Specifications from Mr. Wm. Dunbar, burgh surveyor.

London.—STEPNEY.—July 11th. Electricity Supply Department. Boilers and boiler-house accessories, turbo-alternator, condenser, accessories, and switchgear. (June 3rd.)
METROPOLITAN ASYLUMS BOARD.—July 13th. Overhauling and repairing two Willans & Robinson electric generating sets at Colindale Hospital. (July 1st.)
KENSINGTON.—July 21st. Board of Guardians. Installation of new power mains for X-ray and electro-medical work at St. Mary Abbots Hospital. (See this issue.)

Manchester.—July 19th. Waterworks Department. One electrically-driven air compressor, transformer, pipes, valves, wiring, &c.; six 200-b.h.p. d.c. electric motors, speed reduction gears, cables, wiring, &c. Specifications from the Waterworks Engineer, Town Hall, Manchester.

Newcastle-under-Lyme.—July 11th. Electricity Supply Department. 350-kW rotary convertor, with e.h.p. and l.p. switchgear. (June 24th.)

New Zealand.—WELLINGTON.—August 9th. Public Works Department. 1,500 suspension insulator strings and 470 strain insulator strings. (B.X. 3533.)*
September 13th. Two sets 110-kV outdoor switchgear for the Waikato electric power scheme. (B.X. 3579.)*
October 4th. Batteries and charging sets for Mangahao electric power scheme. (B.X. 3580.)*
September 27th. One 15-ton electrically-operated overhead travelling crane. (A.X. 4849.)
October 4th. 50-kV lightning arrestors for Waikaremoana. (B.X. 3603.) 11,000-V switchgear and metering equipment. (B.X. 3602.) 50-kV lightning arrestors for Waikato. (B.X. 3605.)
October 25th. 10,000-kVA transformers for Waikato. (B.X. 3604.)
August 18th. Corporation Tramways. One electrically-operated tramcar traverser. (A.X. 4801.)*

Shitlington, West Riding.—July 19th. West Riding Education Committee. Electrical installation for the Middlestown new school. Specifications, &c., from Education Department, County Hall, Wakefield.

Singapore.—July 25th. Municipal Commissioners. One 10,000-kW turbo-alternator and condensing plant. (June 24th.)

Swansea.—July 11th. Education Committee. Installation of wiring and fittings for electric light in the following Council schools:—Brynmell, Brynhyfryd, Cadle, Danygraig, Gendros, Hafod, High School for Girls, Lontas, Oystermouth, Plasmarl, Rutland Street, St. Thomas, Tirdeunaw, and Waunwen. Specifications from the Borough Electrical Engineer.

Switzerland.—BERNE.—Swiss Federal Railway authorities. 15,600-h.p. Pelton turbine, a 10,000-kVA single-phase alternator, and a 10,000-kVA, 15/66-kV single-phase transformer for the Barberine hydro-electric station. Also, for the Trient sub power station two 1,850-h.p. Pelton turbines, one 2,800-kVA alternator and one 2,800-kVA, 7.8/66-kV transformer. Particulars for 5 fr. from the Abteilung für Elektrifizierung, Zimmer 167, Dienstgebande, 43, Mittelstrasse, Berne.

Uruguay.—MONTEVIDEO.—August 5th. State Electricity Works. 16,522 l.p. a.c. meters and spares. (B.X. 3596.)*

Warrington.—July 18th. Electricity Committee. Twelve months' supply of e.h.p. and l.p. paper and lead-covered cables. (July 1st.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Adwick-le-Street.—Urban Council. Accepted:—
Cables for the extension scheme (£8,555).—Callender's Cable and Construction Co., Ltd.

Australia.—SYDNEY.—Electricity Supply Committee.
Blading and accessories for turbines (£506).—Metropolitan-Vickers Electrical Co., Ltd.
Ditto (£2,169).—British General Electric Co., Ltd.
Complete rotor for 5,350-V regulator (£348); ditto for 10,850-V regulator (£405).—Siemens (Aust.) Pty., Ltd.
3¼ tons bare copper cable (£390), 242 yd. lead-covered cable (£216).—W. T. Henley's Telegraph Works Co., Ltd.
Demand meters (£165); watt-hour meters (£428).—Edison Swan Electric Co., Ltd.
Demand meters (£288).—Ferguson, Pailin, Ltd.
H.p. and l.p. underground cables (spec. 1,096) (£68,010).—Standard Telephones & Cables (Aust.), Ltd.
L.p. pin-type insulators (594).—Lawrence & Hanson Electrical Co., Ltd.
L.p. insulator pins (£765).—Australian Insulator Ironworks, Ltd.
Supply of automatic instead of non-automatic control panels in connection with metal-clad switchgear (£2,376).—Metropolitan-Vickers Electrical Co., Ltd.
House-service fuse boxes and fuses (£1,937).—B. W. Electric Co., Ltd.
Ash-handling plant for Bunnerong (sections A and B) and spares (£16,682).—Babcock & Wilcox, Ltd.
BRISBANE.—City Council. Accepted:—
Sub-station plant, switchgear, transformers, &c. (£19,387).—Australian General Electric Co., (for British Thomson-Houston Co., Ltd.).
Mercury-arc rectifier (£6,622).—Evans, Deakin & Co. (for Brown, Boveri & Co.).
H.p. switchgear, feeder panels, and metering (£3,192).—English Electric Co. of Australia (for A. Reyrolle and Co., Ltd.). —*Tenders.*

Bierley.—
Electric lighting installations (wiring on the J. & P. system) for 16 houses and shop and Bierley church schools.—H. Moss (Bradford).

Birmingham.—Electricity Supply Department.
Automatic rotary convertor equipment for Granville Street and Selly Oak sub-stations.—General Electric Co., Ltd.
Rotary convertor for Alma Street sub-station; re-erection of rotary convertor at Bordesley sub-station; automatic rotary-convertor equipment for Cheapside sub-station.—British Thomson-Houston Co., Ltd.
Removal of a rotary convertor from Harborne sub-station to Tyburn Road sub-station; rotary-convertor equipment for Harborne.—Metropolitan - Vickers Electrical Co., Ltd.
500-kW automatic rotary convertor for Shaftmoor Lane sub-station.—Mather & Platt, Ltd.
Rotary convertors, &c., for Bordesley Court Road, Saltley and Greet sub-stations.—Electric Construction Co., Ltd.

Bolsover.—Urban Council. Accepted:—
Electric cables, &c. (£12,760).—Pirelli-General Cable Works, Ltd.

Bradford.—Tramways Committee.
Rewinding, &c., tramcar motors, 30 motors (to equip 15 cars).—English Electric Co., Ltd. (estimated cost £200 per car).

Brighton.—Lighting Committee. Accepted:—
60-ton crane for Southwick works (£2,492).—Herbert Morris, Ltd.
Telpher track for conveying coal to new bunkers (£1,150).—Strachan & Henshaw, Ltd.
Constructional steel work at Southwick power station (£3,823).—Heenan & Froude, Ltd.

Canterbury.—Town Council. Accepted:—
Installing private telephone apparatus between the Corporation stables and the Central Stores Depôt.—Philpot & Son.

Castleford.—Urban Council. Accepted:—
Electrification of the water-circulating system and laundry at the baths (£104).—Masterman & Co.

Dublin.—Borough Commissioners.
Boiler-house plant.—Babcock & Wilcox, Ltd. (£110,225); Sulzer Bros. (£100,507); Thompson Water-tube Boilers, Ltd. (£95,000); Escher, Wyss & Co. (£76,142).

Of these tenders only one, that of Messrs. Babcock and Wilcox, Ltd., was in accordance with the specification requirements. In view of the fact that the figure quoted was much higher than the original estimate, the city electrical engineer, in consultation with Messrs. Babcock & Wilcox, Ltd., arranged to eliminate certain items and, in addition, the firm quoted an extra of £2,400 as an alternative for a working boiler pressure of 250 lb. per sq. in. instead of the present pressure of 165 lb. per sq. in. It has been decided to install plant for the higher pressure, the total amount of the amended tender being £100,125.

Dundee.—It was reported at a meeting of the Corporation Electricity Committee that tenders had been received for eight items of cable. For two of these the lowest offer was from Hogan & Wardrop, for cable of Dutch manufacture at £4,955. The lowest offer for the other items was from Power and Lighting Cables, for German manufacture. The Committee accepted these offers. It was agreed to accept the offer of the A.C.E.C. Co., London, for rotary convertors of Belgian manufacture amounting to £5,650. The corresponding British offer was £6,300. Lower British offers were submitted, but the machines were not suitable for the department's purposes. A British offer for three transformers at a cost of £595 each was accepted.

Edinburgh.—Parish Council. Accepted:—
Automatic push-button control lift for the Council Chamber (£594).—Smith, Major & Stevens.

Finchley.—Electricity Committee. Recommended:—
Cable works (£3,140).—Callender's Cable and Construction Co., Ltd.
Rectifier plant (£3,850).—Hewittic Electric Co., Ltd.
Switchgear (£947).—A. Reyrolle & Co., Ltd.

Hull.—Corporation Telephone Committee.
According to the Yorkshire Press, the committee last week accepted the tender of W. F. Dennis & Co., at £2,752, for German-made cable, an amendment moved by Mr. J. Townend that the lowest British tender of £3,881 should be accepted not being seconded.

Ilford.—Electricity Committee. Accepted:—
1,500-kW motor-convertor for Ley Street works (£4,306).—Metropolitan-Vickers Electrical Co., Ltd.
Dismantling plant at Ley Street works (£505).—John Hornby & Son.
Cable (recommended).—Metropolitan Electric Cable and Construction Co., Ltd.; Greenwich Cable Works, Ltd.; Union Cable Co., Ltd.

The Committee states that the tenders recommended for acceptance are not actually the lowest tenders received, and that it has directed the borough electrical engineer to prepare a statement showing the total difference between the tenders recommended for acceptance and the lowest tenders received for cables of foreign manufacture.

Jugo-Slavia.—It is reported from Belgrade that the municipal authorities of that city have just placed a contract with Brown, Boveri & Co., of Baden, Switzerland, for a new 6,000-kW steam turbine for the local central power station, and for a number of eight-wheel electric motor tramcars.

London.—DEPTFORD.—London Power Co. Accepted:—
Two 35,000-kW turbo-generator sets for the Deptford West power station (approx. £250,000).—Metropolitan-Vickers Electrical Co., Ltd. (Reference is made to this contract in our "Business Notices" to-day.)
ROYAL MAIL STEAM PACKET CO.
Electric lamps.—Edison Swan Electric Co., Ltd.

Mirfield.—Urban Council. Accepted:—
Installing electric light at houses at Jackroyd Lane and Northorpe (£202).—H. Senior.

Northampton.—Town Council. Accepted:—
Wiring Stimpson Avenue Council Schools.—Lowke and Sons, Ltd.

Perth.—Corporation Electricity Committee. Recommended:—
Feeding boiler for the electricity works.—Pulsometer Engineering Co., Ltd.

Salford.—Education Committee.
Installation of electric lighting at the Broughton High School for Girls (£221).—County Electrical Co., Ltd. At Marlborough Road school (£124); Regent Street school (£85).—L. Johnson.
Electricity Committee. Accepted:—
3,000 yd. l.p. cable (£1,792).—N.V. Nederlandsche Kabelfabriek, Delft, Holland.

South Africa.—JOHANNESBURG.—Municipal Council.
Transformers (£3,168).—Paul Gregson, Urquhart & Co. —*S.A. Mining and Engineering Journal.*

York.—Electricity Committee. Recommended:—
Boilers for the generating station (£28,308).—John Thompson, Ltd.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

HEMIT insulating material.

Notes.

Appointments Vacant.

Mains assistant for the borough of Darwen electricity department; charge engineer for the City of Carlisle electricity department; overseer (£250+) and three foremen (£150+) for the Irish Free State Posts and Telegraph department; senior accounts and costs clerk (£310) for the Hackney Corporation electricity department. (See our advertisement pages to-day.)

Co-partnership in Industry.

A week-end conference, organised by the Labour Co-partnership Association, on the subject of co-partnership in industry is to be held at Lady Margaret Hall, Oxford, from to-day, July 8th, to Monday next. Amongst the lectures to be read is one on Saturday by Mr. Emile Garcke, M.I.E.E., vice-president of the Association, on "The Object of Co-partnership Schemes"; Mr. H. Bates Thompson, M.A., of Messrs. Thompson Bros. (Bilston), Ltd., will preside on that occasion. In the evening Mr. F. J. Maynard, secretary of the National Transport Workers' Federation, will lecture on "The Attitude of Labour towards Efficiency in Industry." One of the lectures on Sunday will deal with the industrial conditions in the United States as compared with Great Britain, the author being Mr. M. B. U. Dewar, managing director of the Metropolitan Carriage, Wagon and Finance Co., Ltd., who was a member of the Government Delegation appointed to study industrial conditions in Canada and the United States.

The Illuminating Engineering Society.

The annual meeting of the Illuminating Engineering Society was held in the lecture theatre of Holophane, Ltd., on June 21st, Mr. D. R. Wilson presiding. The report of the Council, presented by Mr. L. Gaster, as usual contained a record of useful work. The papers and discussions during the past session were of an exceptionally interesting and varied character. Reference was made to the various B.E.S.A. specifications dealing with portable photometers, industrial reflectors, illuminating glassware, street lighting, &c., already issued or on the point of completion; also to the series of technical papers issued by the Illumination Research Committee of the Department of Scientific and Industrial Research. In all this work members of the Illuminating Engineering Society play an important part.

It was mentioned that the Bill for amending and consolidating the Factory Acts contained provisions for adequate and suitable lighting in factories, and that the Industrial Museum, in connection with the Home Office, to be opened shortly, would contain exhibits illustrating the principles of good factory lighting. There were now illuminating engineering societies in Germany, Austria, Japan, and Holland—the last-named society was formed during the past year.

The report also mentioned the steps that were being taken to revive several of the standing committees for which opportunities of useful service existed—especially that dealing with education in illuminating engineering, and the framing of courses for inclusion in the curricula of leading educational institutions. Steps were also being taken with a view to the incorporation and registration of the Society and to the preparation of suitable Articles of Association. In conclusion the report emphasised the need for increased membership and additional financial support, in order that the work of the Society might be extended.

The report was unanimously adopted, and the election of Mr. D. R. Wilson as president was approved; Mr. C. C. Paterson, Lt.-Col. K. E. Edgcumbe, and Mr. L. Gaster were made vice-presidents, and the following gentlemen were elected to fill vacancies on the Council: Mr. J. G. Clark, Mr. A. Cunnington, Mr. W. J. Jones, Mr. J. B. Lawford, Mr. C. C. Paterson, Mr. A. G. Porri, Lt.-Col. C. H. Sylvester Evans, Mr. H. H. Thompson, and Mr. J. W. T. Walsh.

In the course of the discussion members expressed their satisfaction with the very active work carried out during the session, and the question of securing additional members and further financial support was considered. Mr. Gaster presented figures to show the very moderate expenditure at which the Society was run, and explained that whilst Mr. Dow and he had given their services free to the Society from the start and would continue to do so, they now felt that it was expedient that funds should be available to provide paid assistance to deal with its increasing work.

Fatality.

An inquest was held at Dodworth on June 29th into the death by electric shock of William Edward Lister, a linesman employed by the Yorkshire Electric Power Co., whilst he was working near Silkstone Fall Colliery on June 28th. Mr. W. Nunn, foreman linesman, stated that they were engaged in testing the overhead cable from the borough power station to the colliery. He made an earth test of the cables, and found No. 1 was dead, and No. 2 alive. Lister was then instructed to climb the poles to No. 1 cable. The poles were distinctly marked with 5-in. letters No. 1 and No. 2 cable. Lister, who was wearing his belt, climbed the wrong pole and touched the live wire, which threw him off, and he hung head downwards, suspended from the pole by his belt. Witness telephoned for the power to be cut off, but when Lister was brought down he was dead. He would receive a shock at 6,500 V. A verdict of "Accidental death" was returned.

Electrical Association for Women.

On June 13th members of the E.A.W. visited the studio of Mrs. Cecile Francis-Lewis, Soho Square, where they were shown some of the uses of electricity as applied to handicrafts. The party was very interested in the small electric tools and appliances used in such handicrafts as poker-work, leather-work, and batik, and in the making up and wiring of shell flowers with small electric lamps for table decoration.

On June 23rd a large party of members were invited to the showrooms of Messrs. Hailwood & Ackroyd, Ltd., where they took keen interest in Mr. Hailwood's talk on "The Manufacture of English Glassware," and in the many fine examples of their products to be seen in the showrooms.

Electrical Installations in Canada.

A *Reuter* message from Winnipeg states that under the auspices of the Canadian Engineering Standards Association, a representative committee on the Canadian electrical code has approved a draft code covering electrical wiring and the installation of electrical apparatus in Canada. The Provincial Governments will co-operate with the necessary enabling legislation giving the national endorsement, thus obviating the multiplicity of regulations now existing in the various provinces and also the necessity of securing the approval of the Chicago Laboratories as hitherto required by the Insurance Underwriters' Association. British exporters of electrical apparatus for use in Canada have frequently protested against the discrimination of Chicago in refusing to endorse British equipment for installation in Canada.

Fuel Research.

During last week an International Fuel Technology Conference was held in London, at which the methods of collective study of the fuel problems of England, France, Germany, and Australia were discussed and a basis for co-operative action was arrived at. Arrangements were made for the erection of plant on a large scale for the distillation of black and brown coal, and for the treatment of the products of distillation with a view to the most efficient utilisation of the constituents of the raw fuel.

A Radium Find in France.

The Paris correspondent of the *Morning Post* reports that extremely important radium deposits have been discovered at Saint-Rémy-sur-Durolle, near Clermont-Ferrand. Although it is impossible as yet to make any estimate of the amount, superficial borings have shown that a seam of mineral deposit rich in radium extends for over half a mile.

A mineralogist of the district, M. Demarty, claims to have discovered a process whereby one gramme of radium can be obtained from about 12 tons of the raw material, whereas formerly 80 to 100 tons even of the richest deposits had to be chemically treated to secure a similar amount.

I.E.E. Benevolent Fund.

On Wednesday next a golf competition, for a trophy presented by Mr. G. P. Dennis, M.I.E.E., organised by the Mersey and North Wales (Liverpool) Centre of the I.E.E., will be held on the links of the Woolton Golf Club. Other prizes have been presented by Messrs. T. B. Morgan, P. J. Robinson, and J. L. F. Vogel. The purpose of the competition is to assist the I.E.E. Benevolent Fund.

B.E.S.A. Publications.

Two specifications, No. 246-1927, for face-plate starters for d.c. motors, and No. 247-1927, for face-plate starters for a.c. 2- and 3-phase induction motors with slip rings, have recently been issued by the British Engineering Standards Association to supersede B.S.S. No. 82-1919, which covered all types of face-plate starters for both d.c. motors and a.c. slip-ring induction motors. In the new specifications the first sections are common to both, and give general definitions of the various types of starters and definitions of enclosures for face-plate starters. In the d.c. specification the standard b.h.p. sizes and rated voltages have been revised. Two classes of rating—ordinary and heavy duty—are recognised as standard, and limits for the starting current and starting period have been fixed for each. The particulars to be marked on the starters and a complete list of revised terminal markings are given. The specification includes sections dealing with design and construction, and sets out in correct order the dielectric and performance tests to be carried out on the completed starter. The final section deals with information relating to the starter, supply circuit, motor and service conditions to be supplied to the maker with inquiry. An appendix gives a useful table of full-load currents for all standard sizes and voltages. The specification for the a.c. equipment is similarly arranged, but contains, in addition, the information appertaining to a.c. starters. An appendix gives a list of full-load stator currents for all b.h.p. sizes at 230 V, and 400 V for three-phase, and 200 V and 400 V for two-phase motors. Copies of the new issues may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 2s. 2d. each, post free.

Educational.

ROYAL TECHNICAL COLLEGE, GLASGOW.—Departments of Engineering.—The 1927-28 session commences on Tuesday, September 20th. Prospectus (gratis) or the Calendar, by post 3s., can be obtained on application to the director. (See our advertisement pages to-day.)

IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY—APPOINTMENTS BOARD.—Employers requiring men who have received a thorough training in the principles of engineering and who have obtained the diploma of the City and Guilds (Engineering) College are asked to make use of the services of the Board. Applications should be addressed to the secretary. (See our advertisement pages to-day.)

Central Scotland Electricity Scheme.

On May 11th the Central Electricity Board published the Central Scotland Electricity Scheme, 1927, in the form in which it was received from the Electricity Commissioners, and gave notice that authorised undertakers and other persons interested might make representations thereon up to June 14th. Certain representations were received, as a result of which some detailed modifications have been made in the scheme. The Board has now adopted the scheme as amended, and republished it in its final form on July 1st.

Comparison of the two schemes shows that the following alterations have been made:—

Dalmarnock power station: The additions to be carried out for the winter of 1932-33 are raised from 25,000 to 40,000 kW; the same applies to the additions to be made for the winter of 1935-36.

Portobello power station: The additions to be carried out for the winter of 1937-38 are reduced from 50,000 to 30,000 kW.

Main transmission lines: Reference to the acquisition by the Board of the 11,000-volt lines from Corra Linn to Stonebyres, and from Stonebyres to Motherwell, has been deleted.

The name "Bonnington" has been substituted for "Corra Linn" wherever it appears.

An account of the scheme was published in the ELECTRICAL REVIEW of May 13th, p. 754.

Institution Notes.

Institute of Transport.

Mr. Roger T. Smith, B.Sc., M.I.E.E., has been elected president, to take office on October 1st, 1927, and will deliver his presidential address at the opening meeting on Monday, October 10th. The annual general meeting will be held on November 7th.

Institution of Public Lighting Engineers.

The hon. secretary of this Institution, Capt. W. J. Liberty, has made application to the Ministry of Health in respect of the expenses of the delegates attending the annual meeting of the Institution at Brighton in September next, and has been informed that the Minister sanctions under the Local Authorities (Expenses) Act, 1887, the payment of the reasonable expenses incurred in connection with the attendance of two delegates, one of whom should be the engineer or superintendent of public lighting in the district, in the case of any local authority whose accounts are subject to Government audit and which may wish to be represented at the proposed conference; individual applications to the Minister for sanction in respect of the conference will not be necessary so long as the proposed expenditure is within the limits indicated.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. D. MAXWELL BUIST, A.M.I.E.E., has been appointed chief electrical engineer to Synthetic Ammonia and Nitrates, Ltd., Billingham. Mr. Buist was formerly with the Fife Electric Power Co., and the Hull Corporation. The commencing salary of his new appointment is £1,000 per annum.

The *Yorkshire Post* reports that the Hull Corporation Electricity Committee held a meeting last week "to consider the situation arising at the electrical undertaking by reason of the engineer (Mr. H. BELL) being a candidate for the position of chief engineer under the Belfast Corporation electricity undertaking; and the resignation of Mr. BUIST, who has received an appointment at Stockton-on-Tees." The Committee (subject to the approval of the City Council) agreed to offer Mr. Bell a salary of £1,500 a year to remain in his present position at Hull.

Mr. C. E. WETTON, for many years London manager of the British Insulated Cables, Ltd., and a well-known figure in the cable industry, has recently retired at the age of 66. Over 40 years ago Mr. Wetton was serving with Messrs. Paterson & Cooper, and in 1888 he joined the Telegraph Manufacturing Co., Ltd., of Helsby, as sole sales representative for the British Isles. On the amalgamation of the latter company with the British Insulated Wire Co., Ltd., of Prescot, in 1902, Mr. Wetton was appointed London manager,

Photo by [*Blomfield.*

Mr. C. E. Wetton.

which position he has since held with distinction, having fully played his part in assisting the growth of the company from its comparatively small beginning to its present size. For some years Mr. Wetton's health has been failing, and latterly it has only been his indomitable spirit which has enabled him to carry on. We join with his many friends in wishing him a complete recovery and many years in which to enjoy his well-earned rest.

Last week Mr. JOHNSTONE WRIGHT was the guest of honour at a luncheon, upon the occasion of his departure from Belfast to take up his new appointment under the Central Electricity Board. The function was arranged by Belfast electrical men. The speakers bore testimony to Mr. Wright's good work as city electrical engineer, and congratulated him upon his appointment. Mr. Wright was presented with some Ulster linen as a souvenir of the occasion.

It is announced that Mr. Johnstone Wright's successor at Belfast is to be Mr. F. H. WHYSALL, burgh electrical engineer of Greenock. His salary will be £1,500.

A number of presentations have been made to Mr. O. R. PARRY, chief electrical engineer of the Sneyd Collieries, upon his departure to take up an appointment with Messrs. Richard Cadman & Son. Mr. Arnold Ashley, on behalf of the company, presented Mr. Parry with a gold wristlet watch and a gold fountain pen and pencil. The Transport Department gave him a silver cigarette case.

Major R. G. BEER, M.C., who is leaving after several years' service as manager of the Chelmsford electricity supply undertaking, has been presented by the staff with a clock, and Mrs. Beer with a piece of jewellery. He is succeeded by Mr. R. P. Harper, who has been engaged at the Chelmsford station for about three years.

The Ilford Town Council has increased the salary of its electrical engineer from £1,029 to £1,086.

Mr. FRANK GILL, O.B.E., M.I.E.E., past president of the Institution of Electrical Engineers, has been elected unopposed to fill a vacancy on the Beckenham Urban Council.

Mr. JOHN C. ORKNEY, lecturer in the department of mechanics and mechanical engineering, Royal Technical College, Glasgow, has been appointed head of the electrical engineering department of Robert Gordon's Colleges, Aberdeen.

On June 27th, Mr. S. J. WATSON, who has been city electrical engineer of Salford for the last 4½ years, was presented by members of his staff, as a token of their esteem and regard, with a handsome tea and coffee service, the tray accompanying the service being suitably inscribed, on the occasion of his leaving Salford to take up the position of chief engineer to the London and Home Counties Joint Electricity Authority.

In connection with its annual sales conference, Metro-Vick Supplies, Ltd., gave a farewell dinner on July 1st, at the Engineers' Club, to Mr. A. E. ILIFFE, who has resigned his appointment as sales manager to the company in order to take up the position of general sales manager to the Benjamin Electric, Ltd. Sir Herbert Morgan (chairman) presided, and among those present were Sir Philip Nash, K.C.M.G., Mr. A. McKinstry, Mr. P. F. Crinks, Mr. E. Cooke, together with all departmental managers, branch managers, and general managers of allied factories. In making the presentation to Mr. Iliffe of an inscribed gold cigarette case, Mr. Crinks made special reference to the feeling of goodwill and friendship that had existed in the past, and assured Mr. Iliffe that the company wished to maintain that friendly spirit. Mr. A. E. du Pasquier, Mr. Cooke and others in their speeches wished Mr. Iliffe good luck and all success in his new appointment. Mr. Iliffe, responding, said that he was touched by the many expressions of appreciation, and tendered his thanks to all who had so loyally supported him and thus enabled success to be achieved. Mr. Iliffe will be commencing his new duties on August 4th.

Mr. SYDNEY BRYAN DONKIN, M.Inst.C.E., M.I.Mech.E., M.I.E.E., has been elected chairman of the Committee of the Association of Consulting Engineers for the year 1927-1928.

Obituary.—MR. STUART A. RUSSELL.—As we briefly recorded in our last issue, just at the moment of going to press, Mr. Stuart Arthur Russell, Assoc.M.Inst.C.E., M.I.E.E.,

The late Mr. Stuart Arthur Russell.

passed away on June 26th, at his residence, 61, Wynnstay Gardens, Kensington. The funeral service took place on June 30th, at St. Philip's Church, Earl's Court Road, the interment following at Putney Vale Cemetery. Mr. Russell, who was in his 69th year, was the son of the late Judge Russell. Together with his brothers Archibald, Charles and Edwin he was educated at University College School and University College, London, at which latter place he took the full engineering course. He served his time in the shops at the London and North-Western Railway Works, Crewe, and afterwards had drawing office experience with Messrs. Hunter & English, of Bow, where he worked under Mr. Peter Willans. On leaving these works he joined the staff of Messrs. Ayrton & Perry, and was mainly engaged there on telpherage work. He left that firm to join the Electric Lighting Department of the Silvertown Company in 1883, and was engaged in the designing and construction of dynamos for some years, and further interested himself in electric light cables, writing a book on the subject, which was immediately adopted as Whittaker's text-book. While at Silvertown in the Electrical Department of the I.R.G.P. & T. Works Co., Ltd., Mr. Russell designed the switchboard and electrical equipment of the electrical stations in Brussels, Leith, Greenock, Canterbury, Hereford, and many other towns at home and abroad. Owing to the retirement of one or two of the staff, he had been working for the last twelve years as works manager, at Silvertown, and as adviser in the establishment of the new works at Burton-on-Trent. In 1918 he was appointed an extraordinary director, which position he held at the time of his death, although, owing to illness, he had been unable to take any active part in the affairs of the company for over three years. He was a member of the General Committee of the India Rubber Manufacturers' Association for several years (chairman in 1920 and 1921), a member of the board of management of the British Rubber and Tyre Manufacturers' Research Association, a member of the Executive Committee of the Federation of British Industries, of the Council of the London Chamber of Commerce, and of the Executive Committee of the Engineering and Allied Employers' London and District Association, until his illness compelled him to relinquish those appointments. Mr. Russell was a good engineer and mathematician, and so reliable in everything he undertook that he will be very difficult to replace, while his conscientious methods and sense of humour will be missed by all who had the pleasure of knowing him. He had many sincere friends, who appreciated his constant desire to help those in trouble. We are indebted to our contemporary the *India Rubber Journal* for the accompanying photograph of Mr. Russell.

MR. T. K. KINGDON.—The death occurred, at Agra, on June 27th, as a result of enteric fever, of Mr. Thomas Karl Kingdon, one of Callender's Cable and Construction Co.'s Indian engineers. Mr. Kingdon was educated at Marlborough and Faraday House, and was an associate member of the Institution of Electrical Engineers.

MR. C. L. TEMPLER.—The death has taken place, at Rugby, of Mr. Charlie Lionel Templer, A.M.I.C.E., who was for many years on the staff of Willans & Robinson. He was 63 years of age, and at the time of his death he was a director of the Yorkshire Engineering Supplies, Ltd., of Leeds.

MR. T. BARTON.—Mr. Thomas Barton, M.I.E.E., who for half a century carried on business at The Electric Works, Blackburn—an undertaking which at one time supplied the town with electricity, died on July 2nd, aged 73. On leaving Ainsworth Street he established a business in Northgate, Blackburn.

MR. J. A. PRIESTLEY.—The death occurred suddenly, on June 29th, while he was playing golf, of Mr. J. A. Priestley, cleansing superintendent of the Sheffield Corporation, who, as our readers will remember, employed a fleet of electric dust carts for the collection of the city refuse, and prepared an interesting report upon their operation. Mr. Priestley was chairman of the Electric Vehicle Committee of the E.D.A., and did very valuable work in this direction.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Wellington Sun Ray Centre, Ltd.—Private company. Registered June 25th. Capital, £500 in £1 shares. Objects: To carry on the business of medical and general electricians, masseurs, radiologists, actino-therapists, hydro-therapists, electro-therapists, &c. The first directors are:—L. J. Jeffery, 12, Garth Road, Stockport, Cheshire; M. Harwood, 17, London Road, Hazel Grove; G. W. Hallworth, "Pen Dinas," Green Lane, Hazel Grove, near Stockport; J. Burns, 19, St. Saviours Road, Great Moor, Stockport; A. Hinchliffe, 24, Mall Street, Gorton. Qualification, £50 shares. Secretary: L. L. Geffery. Solicitor: Chas. W. Ingham, 32, St. Petersgate, Stockport.

Vee Cee Dry Cell Co. (1927), Ltd.—Private company. Registered June 29th. Capital, £2,000 in £1 shares. To adopt an agreement between H. M. West of the first part and the Vee Cee Dry Cell Co., Ltd. (in liquidation), and the said H. M. West of second part, and this company of the third part, and to carry on the business of manufacturers of and dealers in electric dry cell batteries, electric lighting and ignition apparatus, accessories, equipment and appliances, electrical engineers and contractors, &c. The permanent directors are:—J. Hall-Dalwood, 1, Albemarle Mansions, Finchley Road, N.W., barrister; R. White, 141, Neasden Lane, N.W.10, sales manager; H. M. Howard, "St. Tudno," Church Walk, Peterborough, cement merchant; R. Lugg, 1, Church Walk, Peterborough, brick merchant. Solicitors: Smith, Rundell, Dods & Bockett, 9, John Street, Bedford Row, W.C.1. Registered office: 5a, Queen's Way, Ponders End, Middlesex.

Ricardo & Co. Engineers (1927), Ltd.—Private company. Registered June 30th. Capital, £21,000 in 20,000 10 per cent. cumulative participating preference shares of £1 each and 20,000 founders' shares of 1s. each. Objects: To acquire the business of Ricardo & Co., Engineers, Ltd., and to carry on the business of electrical and mechanical engineers, consulting engineers, engineering and technical advisers, designers, machinists, fitters, founders, &c. The directors are:—A. A. C. Swinton, F.R.S., &c., 40, Chester Square, S.W.1 (director of Parsons Marine Steam Turbine Co., Ltd., and other companies); S. A. de la Rue, The Hoo, Willingdon, Sussex; S. F. Staples, High Coombe, Balcombe, Sussex (director of Helters, Ltd., and other companies); H. R. Ricardo, Penstone, Lancing, Sussex; H. A. Hetherington, 13, Ovington Square, S.W. (director of Bentley & Draper, Ltd.); Viscount Combermere, 19, Wetherby Gardens, S.W.5; R. C. B. White, Arddarroch, Garelochhead, Dumbartonshire, N.B. Secretary: C. J. Baker. Solicitors: Rooper & Whateley, 17, Lincoln's Inn Fields, W.C.2. Registered office: 21, Suffolk Street, Pall Mall, S.W.1.

Malcolm & Allan (London), Ltd.—Private company. Registered June 30th. Capital, £10,000 in £1 shares. Objects: To carry on the business of contractors, engineers, builders, plumbers, metal founders, carpenters, electricians, constructors of and dealers in motors, motor-cars and motor-boats, suppliers of electricity or gas for light, heat, motive power or otherwise, &c. The first directors are:—J. A. Mathers (chairman), 6, The Drive, Orpington, Kent; H. S. Butler, 22, Mayville Road, Ilford, Essex. Secretary: J. A. Mathers. Solicitors: Beaumont & Son, 380, Gresham House, E.C.2. Registered office: 12, Henrietta Street, Covent Garden, W.C.2.

E. P. Cottier, Ltd.—Private company. Registered July 1st. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical, mechanical, and general engineers, manufacturers of and dealers in electric lamps, electricity meters, switches, cut-outs, other electrical apparatus, &c. The directors are:—Mrs. Ethel D. Cottier, 2, Wellington Terrace, Wallasey, Cheshire; A. E. Ablewhite, 43, Rivington Road, Wallasey. Solicitor: F. W. Jackson, 57, Moorfields, Liverpool. Registered office: 13, Cunliffe Street, Liverpool.

Primrose & Primrose, Ltd.—Private company. Registered June 25th, in Edinburgh. Capital, £10,000 in 7,000 6 per cent. cumulative participating preference and 3,000 ordinary shares of £1 each. Objects: To carry on the business of general, electrical, constructional and mechanical engineers, contractors, merchants, &c. The first directors are:—J. S. A. Primrose, 10, Windsor Circus, Glasgow, electrical engineer; R. C. Primrose, 12, Windsor Quadrant, Glasgow, electrical engineer. Secretary: J. Henry Downes. Registered office: 199, Bath Street, Glasgow.

Claude Lyons, Ltd.—Private company. Registered June 25th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio receiving and transmitting apparatus, component parts, and all supplies relating thereto, &c. The life directors are:—C. L. Lyons and L. M. Lyons, 76, Old Hall Street, Liverpool, general merchants. Solicitor: J. R. H. Giles, 61, Lord Street, Liverpool. Registered office: 76, Old Hall Street, Liverpool.

R. B. Dunlop & Co., Ltd.—Private company. Registered in Edinburgh June 25th. Capital, £3,000 in £1 shares. Objects: To carry on the business of mechanical, electrical and general engineers, &c. The first directors are:—R. B. Dunlop, 69, Mosspark Drive, Glasgow, engineer; W. Mather, Sarona, Busby, Lanarkshire, jeweller and diamond merchant; A. F. Mackay, 137, Holmhead Crescent, Cathcart, engineer. Registered office: 372, Scotland Street, Glasgow.

Official Returns of Electrical Companies.

Notting Hill Electric Lighting Co., Ltd.—Capital, £201,352 10s. in 2,998 cumulative preference and 17,002 non-cumulative preference shares of £10 each and 27,050 deferred shares of 1s. each. Return dated May 24th, 1927. 2,998 cumulative preference, 11,402 non-cumulative preference, and 27,050 deferred shares taken up. £145.352 10s. paid. Mortgages and charges, £79,000. Ditto guaranteed jointly by this company and the Kensington and Knightsbridge Electric Lighting Co., Ltd., under powers of the Kensington and Notting Hill Electric Lighting Co.'s Act, 1899, £172,219. Resolved, May 10th, 1927, that the 11,402 6 per cent. non-cumulative shares of £10 which have been issued and are fully paid up, and the unissued 5,600 6 per cent. non-cumulative preference shares of £10 be converted into 6 per cent. cumulative preference shares, to rank *pari passu* with 2,998 6 per cent. cumulative preference shares already issued.

Charing Cross Electricity Supply Co., Ltd.—Capital, £2,450,000 in 400,000 preference, 1,100,000 ordinary, 400,000 "City Undertaking" preference, and 550,000 "City Undertaking" ordinary shares of £1 each. Return dated April 13th, 1927. 400,000 preference, 1,036,800 ordinary, 400,000 "City Undertaking" preference and 550,000 "City Undertaking" ordinary shares taken up. £1,280,000 paid on 400,000 preference, 480,000 ordinary, and 400,000 "City Undertaking" preference shares. £1,106,800 considered as paid on 556,800 ordinary and 550,000 "City Undertaking" ordinary shares. Mortgages and charges, £1,036,111.

Reason Manufacturing Co., Ltd.—Capital, £52,500 in 200,000 preference and 10,000 ordinary shares of 5s. each. Return dated February 16th, 1927. £92,000 preference and 10,000 ordinary shares taken up. £2,349 5s. paid on 9,397 preference shares. £23,150 15s. considered as paid on 82,603 preference and 10,000 ordinary shares. Mortgages and charges, £12,000.

Mansfield and District Tramways, Ltd. — Capital, £180,000 in 80,000 preference and 100,000 ordinary shares of £1 each. Return dated March 29th, 1927. 80,000 preference and 44,834 ordinary shares taken up. £80,609 paid on 62,767 preference and 17,842 ordinary shares. £44,225 considered as paid on 17,233 preference and 26,992 ordinary shares. Mortgages and charges, £61,011.

Mather & Platt, Ltd.—Capital, £2,500,000 in 40,000 preference shares of £10 each and 2,100,000 ordinary shares of £1 each. Return dated March 14th, 1927. 40,000 preference and 1,363,660 ordinary shares taken up. £630,660 paid on 29,200 preference and 338,660 ordinary shares. £1,133,000 considered as paid on 10,800 preference and 1,025,000 ordinary shares. Mortgages and charges, nil.

London Electric Wire Co. & Smiths, Ltd.—Capital, £1,250,000 in 500,000 preference and 750,000 ordinary shares of £1 each. Return dated April 22nd, 1927. 400,000 preference and 644,070 ordinary shares taken up. £350,035 paid on 350,000 preference and 35 ordinary shares. £694,035 considered as paid on 50,000 preference and 644,035 ordinary shares. Mortgages and charges, nil.

Pritchett & Gold & E.P.S. Co., Ltd.—Capital, £200,000 in 100,000 preference and 100,000 ordinary shares of £1 each. Return dated April 18th, 1927. All shares taken up. £30,594 paid on 15,233 preference and 15,161 ordinary shares. £169,606 considered as paid on 84,767 preference and 84,839 ordinary shares. Mortgages and charges, £18,000.

River Plate Electricity Co., Ltd.—Capital, £533,000 in £150,000 preference stock and £383,000 ordinary stock. Return dated April 21st, 1927. All stock taken up. £106,751 paid on £50,000 preference and £56,751 ordinary stock. £426,249 considered as paid on £100,000 preference and £326,249 ordinary stock. Mortgages and charges, nil.

Crossley Bros., Ltd.—Capital, £1,492,293 in 403,390 ordinary shares of £1 each and 1,015,414 ordinary shares of 10s. each, and 581,196 unissued shares. Return dated March 10th, 1927. 403,390 ordinary and 1,015,414 ordinary shares taken up. £405,700 paid on 278,000 preference and 255,000 ordinary shares. £505,397 considered as paid on 125,190 preference and 760,414 ordinary shares. Mortgages and charges, nil.

Thermo Electric, Ltd.—C. J. G. Palmour, of 4b, Fredericks Place, Old Jewry, E.C., was appointed receiver on June 17th, 1927, under powers contained in debentures dated May 15th, 1919. This appointment has been effected in consequence of the death of Sir Arthur Whinney, K.B.E., the former receiver.

J. L. Maughan & Co., Ltd.—Mortgage on 29, Carliol Street, and 13, Erick Street, Newcastle-upon-Tyne, dated June 17th, 1927, to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd., not exceeding £1,600.

Anglo-Portuguese Telephone Co., Ltd.—Satisfaction in full on May 20th, 1927, (*a*) of 5 per cent. mortgage debenture stock trust deed dated March 4th, 1905, securing £50,000, and (*b*) of 5 per cent. extension debenture stock trust deed dated March 31st, 1919, securing £50,000.

Herbert Ward, Ltd.—Mortgage or charge on the company's undertaking and property, present and future, including uncalled capital, dated May 31st, 1927, to secure £600. Holders: W. T. Flower and W. E. Hamlin, both of 12, Wimbledon Hill Road, S.W.19.

County Electrical and Wireless Stores, Ltd.—Satisfaction in full on May 31st, of debenture dated February 17th, 1927, securing all sums owing from the company on the balance of its current account with Burndept Wireless, Ltd., whether in respect of loans or current accounts or otherwise.

Blockley Electrical Engineering Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1926 (filed March 2nd, 1927). All shares taken up. £1,000 paid. Mortgages and charges, nil.

Wilfrid Francis & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated March 30th, 1927. 465 shares taken up. £465 paid. Mortgages and charges, nil.

Wrexham Motor and Electrical Engineering Co., Ltd.—Capital, £5,000 in £1 shares. Return dated December 31st, 1926 (filed February 15th, 1927). 1,428 shares taken up. £1,428 paid. Mortgages and charges, nil.

Radio Accessories, Ltd.—E. Maloney, C.A., of 11, Ironmonger Lane, E.C., was appointed receiver on June 21st, under powers contained in debenture dated February 10th, 1927.

Orford Electric Light and Power Co., Ltd.—G. Weir, C.A., of 16, Brentway, Church End, Finchley, was appointed receiver on June 15th, 1927, under powers contained in debenture dated November 1st, 1923.

Rangoon Electric Tramway and Supply Co., Ltd.—Satisfaction to the extent of £800 on April 13th, 1927, of debenture stock dated February 1st, 1906, December 22nd, 1908, November 5th, 1913, and January 25th, 1924, securing £250,000.

Marpole & Frisby, Ltd.—Debenture dated June 3rd, 1927, to secure £250, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: A. N. Frisby, 9, The Avenue, Ilford.

Blendon Light Rail Co., Ltd.—Capital, £12,000 in £1 shares. Return dated March 30th, 1926 (filed February 21st, 1927). 5,927 shares taken up. £1,925 paid. £4,000 considered as paid. £2 calls unpaid. Mortgages and charges, nil.

Newcastle and District Electric Lighting Co., Ltd.—Capital, £300,000 in £1 shares. Return dated March 31st, 1927. All shares taken up. £300,000 paid. Mortgages and charges, £313,600.

Kent Bros. Electric Wire Company and E. H. Phillips, Ltd.—Issue on June 1st, 1927, of £4,000 debentures, part of a series already registered.

Durelco, Ltd.—Satisfaction in full on June 1st, 1927, of debenture stock created by trust deed dated June 24th, 1921, securing £65,000.

H. T. Bourn, Ltd.—Capital, £800 in £1 shares. Return dated December 30th, 1926 (filed March 10th, 1927). 680 shares taken up. £680 paid. Mortgages and charges, nil.

Uneeda Supplies Co., Ltd.—Issue on May 30th, 1927, of £200 debentures, part of a series already registered.

City Notes.

W. T. Henley's Telegraph Works Co., Ltd.

The annual meeting was held on July 1st, under the chairmanship of Sir George Sutton, Bt. In proposing the adoption of the report (*vide* ELECTRICAL REVIEW, June 24th, p. 1027) the chairman said that the profit for the year was about £4,000 less than for 1925-26. The business was affected adversely by the coal strike, but not to a very great extent so far as orders were concerned, although there was a falling off in some departments; but the cost of the power bill had increased by £24,000. During the year the business had prospered in all its branches. There had been no great change in the demand from overseas; both Dominion and foreign orders had been about normal, but they hoped the coming year would show increases in both directions. He thought he might confidently say that their success in the manufacture of e.h.p. cables was assured. They had carried out many contracts, but as they succeeded in meeting their customers' demands for a perfect cable, their requirements were increased, and the problem of meeting them was always present. The future demand for that type of cable was likely to be very large, and so great was the skill and care required in its production that buyers would look first for reliability; a hundred pounds saved in an initial purchase might easily result in a loss of many thousands by bad service. In general cable and wire work of all kinds, the company's factories were well employed, and they were busy in outside contract work. They were still engaged in South Africa in connection with the electrification of the Cape Town Suburban Railways, and the Government of India had awarded them a contract for the erection of 274 miles of overhead transmission line for the Great Indian Peninsula Railway. They had also recently received an order for the construction and laying of 212 miles of multiple underground cable in Egypt. Those two orders together amounted in value to nearly half a million sterling. Prices of raw material had been very stable during the year, with the exception of india-rubber, which had varied from 3s. 2d. to 1s. 8d. per lb. The Tyre Company was making headway, and when the stocks of foreign tyres in this country were used up they hoped they might benefit by reason of the new import duty. During the year they had erected a fine new building and put down plant to enable them to increase their output of telephone cables. They were disappointed at the small amount of work which they had got for these cables. They relied upon the Post Office developing rapidly the use of the telephone in this country. There was nothing in the world to surpass the system constructed by British Post Office engineers, and yet we were far behind other countries in developing the commercial side. The Treasury should realise that if it cast its bread upon the waters it would return to it after many days, and not very many days at that. Having referred to the satisfactory relations that still continued to exist between the staff and the workpeople, Sir George said that most of them were aware that they had had negotiations with other important cable makers in this country with a view to finding a way of co-operation which would be of advantage to all interested in the cable industry. The objects of those negotiations covered a wide range. There was, in the first place, the question of research. They had expended a large sum of money on very efficient laboratories, and they were carried on at a large annual cost. Surely, there could not be an industry in which research was more necessary, and where results might be so important, as the electrical industry, and the many problems in connection with the distribution of electrical energy directly concerned the cable manufacturer. Other cable factories besides Henley's were spending large sums on research in the struggle to maintain or secure supremacy, and they knew how valuable to all of them and to the British cable industry, would be more intimate relationship, and a knowledge of the investigations in progress and the results being obtained in other laboratories than their own. Then with regard to machinery for producing cables, certain of the cable factories, including their own, designed and made a great deal of their own machinery, and it would be of great advantage to the industry if their knowledge could be combined, so that only the most efficient type of machine, and methods of manufacture, should be used. It was easy for them to realise the value to the buyer of the knowledge that in adopting a type of cable, he was getting the combined experience of the leading manufacturers, and that it was the best which British laboratories and factories could produce. On the selling side of their organisations the exploitation of the world's markets could be more thorough if several houses were acting in concert. He was glad to be able to announce that the protracted negotiations had culminated in an agreement between three of the largest manufacturers. They had reason to expect that other British cable makers would join in their co-operation, and they would be welcomed. During the negotiations they had never forgotten that the interest of the consumer and the worker had to be protected as well as that of the manufacturer: that to be successful in business, good relations must exist with customers and workpeople. They were not without experience in co-operation. They had a record of a quarter of a century of co-operation through the Cable Makers' Association, a co-operation which, besides attaining greater efficiency and lower costs, had produced in the type of cable it controlled a product of high quality which was fully recognised throughout the world. Mr. A. E. Salmon seconded the motion, and the report was adopted. Following the formal business a resolution was unanimously agreed to voting the directors £500 each as a bonus in addition to their ordinary fees.

Callender's Cable and Construction Co., Ltd.

The annual meeting was held on June 30th, Sir J. Fortescue Flannery, Bt., presiding. In proposing the adoption of the report (*vide* ELECTRICAL REVIEW, June 24th, p. 1027), the chairman said that the total profit was down by £12,000, and the general expenses, at £179,000, were about £10,000 less. Bearing in mind that their factories actually ceased work for some time and that from May until November they were hampered in every direction as to supplies of material, transport and otherwise, he thought the results obtained were very satisfactory. They were able to pay the same dividend as for years past, and it had not only been earned, but a substantial sum, after all claims had been met, remained to be carried forward. Since the termination of the coal stoppage, the resumption of business had been slow, but fairly good, but it was idle to deny that in many directions the effect of those unfortunate happenings still remained, and the effects were likely to be felt for some time to come. He was glad to say that their factories at Erith and of the daughter company at Leigh were well occupied with satisfactory orders. The Anchor Cable Co. carried on throughout the strike, but, of course, there had been serious difficulties. Referring to the Okonite Callender Co. of America, he said it now occupied a premier position for the excellent qualities of the cables which it produced. The business of electrical cable work was of a highly technical character, involving not only a great knowledge of theory, but long experience in the application of science. It was therefore a progressive industry, and its advance was largely assisted by laboratory research. There were also cases of valuable advances arising from the inventive genius of those engaged in the industry, and each of the cable-making companies had devoted themselves at great expense to research and the invention and development of many important processes. Hitherto those investigations had been carried out individually by each company without interchange of information. That led to duplication of energy and expense sometimes in reaching identical conclusions. Some few months ago suggestions were made that there should be an exchange of scientific manufacturing data for improving the process of manufacturing all round and to assist in producing the best cables in the most economical manner. The

directors had come to an agreement with the two other leading cable manufacturers of the country for the better conduct of the businesses in which the three firms were so closely interested. It was provided that the research department of each company should work in close touch with similar departments of the associated companies and for the complete use of patents and secret processes employed by each company, and generally for the avoidance of waste and duplication, thus producing the utmost economy and efficiency in manufacture. It was anticipated that that closer working arrangement between the three leading companies would enable them to supply their commodities cheaper and under more favourable conditions than hitherto, and be of advantage to those purchasing and using cables. Sir T. O. Callender, J.P., the managing director, in seconding the motion, referred to the closer working arrangement to which the chairman had alluded, and said it had been a long and tedious negotiation involving many meetings during which there had been important difficulties to overcome. He was glad to say they were all finished, and that the agreement was signed the previous day. He considered that the arrangement was one of the most important ever entered into by the company, and never in the course of their industry was it more necessary that this should be done. They had frequently been face to face with keen competition from abroad, not only at home but on the Continent and overseas, which competition became serious when one considered the low rate of wages paid in several countries, and the protection and other advantages given to native industry in other countries, none of which they possessed. They could much more efficiently meet that competition if they were united than if they each fought alone against the invader. The arrangement did not contemplate financial amalgamation of the companies concerned. It left each of them free to conduct their business as in the past, and the management was untrammelled by unnecessary interference, whilst the valuable connections which had been built up during many years of business would be maintained by each of the parties concerned. They looked for an increase of business as a result of the developments under the Electricity Act. The agreement would tend to more efficient manufacture, and consequently to decreased cost of production, which would have its effect on the selling prices. Replying to a shareholder, the chairman said the two companies to which he referred were the British Insulated Cables, Ltd., and W. T. Henley's Telegraph Works Co., Ltd. The report was adopted.

Greenwood & Batley, Ltd.

Colonel O. C. Armstrong, D.S.O. (chairman) presided at the annual meeting on July 1st. In presenting the report and accounts (*vide* our last issue, p. 29), the chairman said that the anticipations of improved results had been unrealised owing to last year's industrial troubles. The effects were still being felt, but they were able to maintain the rate of dividend. In all the labour disputes of recent years, the men employed in the engineering industry had shown appreciation of the prevailing conditions; that augured well for a continuance of mutual goodwill and understanding in the future, when it was hoped they would enter upon better times. Although their order book was better than it had been at the same time in previous years, the orders still fell far short of the capacity of their works. Foreign orders had fallen off considerably, mainly due to unfavourable exchanges and tariffs. Production costs were, moreover, still too high to allow them to successfully compete with foreign manufacturers. There should be an amalgamation of effort as between industries. If the engineering industry was prepared to accept overseas orders at cut prices, its efforts should not be rendered nugatory by high rail and sea charges. A material reduction in transport costs would aid considerably in enabling their industry to meet foreign competition.

Anglo-Argentine Tramways Co., Ltd.

Sir George A. Touche, Bt. (chairman), presided at the annual meeting on June 30th, and in presenting the report and accounts (*vide* our last issue, p. 27) said that the past year's results showed clearly the adverse conditions with which the company had to contend. The number of passengers carried (and consequently the revenue) had decreased, but the introduction of economies had helped to minimise the reduction in the net receipts. The heavy expenditure upon renewals bore witness to the company's effort to maintain the system in a state of efficiency. The tramway taxes paid to the municipality were one of the latter's most fruitful sources of revenue, and it was one of the things which made an increase of fares necessary. The total amount paid in that way for 1926 was £407,679, more than was received by all classes of shareholders. For the fourteenth successive year they had been unable to pay a dividend on the ordinary shares; that was a striking commentary upon the effect of uneconomic fares. The shareholders were not the only sufferers, however; both the public and the company's workers were adversely affected, and nobody gained. The fall in traffic during the year was attributable, among other causes, to industrial and commercial depression. There had been an improvement in that respect which had been reflected in improved traffic. Omnibuses had become an established institution, and had proved a determined though not, as yet, a serious rival. The chairman then dealt with the company's own omnibus services; in Buenos Aires, he said, their vehicles had been favourably received by the public, and valuable experience had been gained. A concession had been granted by the municipality of Avellaneda, and 70 chassis were in course of transit. Many measures had been taken to deal with the traffic congestion in Buenos Aires, and the company had done its share. Those measures were, however, merely palliatives, and only the construction of the company's second subway would bring real relief. Nevertheless, they could not proceed with the subway until they received a guarantee that there was a reasonable prospect of a financial return; that was the only thing that stood in the way. Since the existing fares were fixed conditions had entirely changed, and they were now totally inadequate, and compared very unfavourably with London and New York fares. The municipality's experts had agreed that there was a need for increased tariffs, and because they believed that view to be supported by the responsible leaders in public affairs they were confident of reaching a satisfactory agreement. In conclusion, the chairman referred to the company's social work and to the celebration last year of its jubilee.

Aron Electricity Meter, Ltd.

This company's report was dealt with in our issue of June 24th (p. 1028). The annual meeting was held on June 28th, when Mr. H. Kahn, who presided, said that the reduction in the net profit was due partly to the industrial dislocation and partly to the uncertainty caused by the new electrical legislation, which had held up electricity schemes with a consequent falling-off in the demand for meters. The Vienna factory had also suffered, but in that case it was due to insane price-cutting by manufacturers which rendered the business unprofitable. The Taximeter Co. also showed reduced profits. It was difficult to foresee the results of the current year. Trade in this country was still hampered by the conditions already mentioned. In Austria, although trade was not good, the prospects were brighter for the current year. Both their London and Vienna factories, however, were in a position to cope efficiently with any increase in orders, and alterations were being made to meet the improved conditions which they hoped would arise when the new legislation became effective.

Burndept Wireless, Ltd.

The *Financial Times* reports that the shareholders have been informed by the directors that they have deemed it necessary, in order to conserve the assets of the company, to acquiesce in the appointment by the Court of a receiver and manager on behalf of the company's bankers, who hold a first charge on the assets. Close examination into the position which has been proceeding continuously from the time of the appointment of the directors nominated by the shareholders disclosed that the losses incurred prior to the establishment of the reconstituted board were considerably heavier than had been anticipated. Consequently it was found necessary as at December 31st, 1926, to provide a sum of £67,432 for special losses, in addition to a trading loss for the year of £66,050. A statement by the receiver and manager appears in our "Business Notes."

Bogota Telephone Co., Ltd.

In December last this company's capital was increased to £300,000 by the creation of 150,000 ordinary shares of £1 each. Last week an extraordinary meeting was held to consider resolutions providing for the issue of 114,886 of these new shares and that the balance should be issued upon such terms as the directors thought fit. It was further provided that the shares to be issued should not be entitled to share in the profits for the year ended June 30th, 1927, and that they should for the following year be entitled to interest at 6 per cent. calculated on the instalments of the issue price from the due dates thereof. Mr. H. Kahn, who presided, explained that the resolutions were necessary, as at present newly-issued shares had to rank *pari passu* with existing shares. The resolutions were passed.

East African Power and Lighting Co., Ltd.

The net profit for the past financial year was £21,077. A dividend of 5 per cent. is being paid (against 3 per cent.), £5,000 is transferred to reserve and £2,818 to depreciation fund, leaving £1,248 to be carried forward. A distributing licence for a large area has been obtained from the Government; this promises a considerable addition to the power load. The Mombasa business is expanding, and arrangements are being made for a supply to the mainland.

W. & T. Avery, Ltd.

The balance at the credit of the revenue account for the past year was £137,592, as against £129,568 for 1925-26. The final ordinary dividend is 10 per cent., making 15 per cent. for the year, as last year. The allocation to reserve is raised from £12,464 to £15,000, and the carry-forward from £47,259 to £52,451.

Colombo Electric Tramways and Lighting Co., Ltd.

As we have already reported, this company has sold the whole of its electricity supply business to the Ceylon Government. It is now announced that the outstanding 5 per cent. first mortgage debenture stock is to be redeemed on December 31st next.

William Beardmore & Co., Ltd.

A committee appointed to advise the board as to the best steps to take in view of the serious effect of industrial conditions on the company's finances has expressed a preliminary view. This is to the effect that the company's resources should be conserved by the suspension of the sinking fund for the first mortgage debenture stock during the current year. As a consideration, the interest on the stock would be increased from 4½ to 5 per cent. A meeting of the holders of the stock was called for June 20th, but there not being a quorum, it was adjourned for a fortnight.

Stock Exchange Notices.

Dealings in the following have been specially allowed by the Committee under Rule 159:—

Mexican Light and Power.—$5,700,000 4 per cent. cumulative redeemable second preference stock, in shares of $5 each; £1,000,000 5 per cent. second mortgage 50-year bonds.

North Metropolitan Electric Power Supply.—250,000 six per cent. cumulative preference shares of £1 each, fully paid, Nos. 900,001 to 1,150,000.

Globe Telegraph and Trust Co., Ltd.

The net revenue for the year ended May 31st last was £340,726, and the addition of £50,990 brought forward makes available £391,716. The total ordinary dividend is 10s. per share, £18,000 is transferred to general reserve, and a balance of £51,375 is carried forward. During the year the remaining certificates of the Submarine Cables Trust were paid off, and the proceeds are being reinvested. The meeting was to be held on Wednesday last.

German Company.

The *Rhenish Electricity Company*, Mannheim, reports that the constructional department experienced a further decline in the erection of local networks in 1926, but an increase took place in the orders for h.p. and e.h.p. installations, including overhead lines and transformer stations for 100,000 and 220,000 V. The accounts show a net profit of 1,379,000 marks, as compared with 1,174,000 marks in 1925, and the dividend is raised from 8 per cent. to 9 per cent.

Austrian Company.

The report of the *A.E.G.-Union Electricity Company*, Vienna, states that sale prices did not improve in 1926, but the turnover exceeded the figures of the maximum pre-war level. The accounts show net profits of 370,000 schillings, as compared with 610,000 sch. in the previous year; the dividend is reduced from 8 per cent. to 5 per cent.

Hungarian Company.

The *Felten and Guilleaume Company*, Budapest, states that a revival took place in 1926, especially through the works, for the Budapest-Vienna cable installation. In the case of insulated conductors the company suffered severely from foreign rivals who sold products at very low prices. The net profits amount to 528,000 pengös, permitting of the payment of a dividend of 9.3 per cent.

Hart Accumulator Co., Ltd.

The report for the year ended December 31st last shows an inclusive net profit of £39,939, as compared with £54,471 in 1925. A balance of £25,439 brought forward is added, making £60,378. From this £10,000 (against £30,000) is transferred to reserve, and it is proposed to pay a final dividend of 10 per cent. on the ordinary shares, making 15 per cent. for the year. A balance of £25,701 is carried forward.

Electric and General Investment Co., Ltd.

During the year ended May 31st last income certificates valued at £4,096 were cancelled, leaving £13,656 outstanding. The gross profit for the year was £10,829, and after providing for debenture interest, purchase of certificates, and preference dividend, there remains a balance of £2,058; this, with the amount brought in (making £44,248) is carried forward.

Petters, Ltd.

The accounts for the year ended March 31st last show a net profit of £34,063. After providing for funding certificate interest and redemption, preference dividend, &c., and placing £10,000 to reserve, a dividend of 6 per cent. is to be paid on the ordinary shares, and £24,811 is to be carried forward. Continued improvement is reported, and the demand for the company's oil engines is well maintained.

Vickers, Ltd.

The committee, consisting of Mr. F. Dudley Docker, C.B., Mr. R. McKenna, and Sir W. Plender, Bt., G.B.E., which was appointed to investigate the affairs of the company, and after the reconstruction continued to act in an advisory capacity, has now resigned. Mr. G. R. T. Taylor has been appointed deputy-chairman.

London Electric Wire Co. & Smiths, Ltd.

An interim dividend of 1¼ per cent. has been declared on the ordinary shares, as last year.

Reduction of Capital.

MARCONIPHONE CO., LTD., AND REDUCED.—A petition has been presented to the High Court for the confirmation of the reduction of the capital of the company from £450,000 to £90,000, and will be heard in London on July 12th.

Smithfield Markets Electric Supply Co., Ltd.

A dividend at the rate of 6 per cent. per annum has been declared on the ordinary shares in respect of the half-year.

British Columbia Electric Railway Co., Ltd.

The dividend in respect of the half-year to June 30th has been declared on the 5 per cent. cumulative perpetual preference stock.

Telegraph Construction and Maintenance Co., Ltd.

An interim dividend of 2½ per cent., free of tax, has been declared, as in 1926.

Traction and General Investment Trust, Ltd.

An interim dividend of 4 per cent. has been declared on the ordinary stock, as in 1926.

Stocks and Shares.

MONDAY EVENING.

Underground Dividends.

THE most interesting feature of the present week in relation to the stocks and shares with which we deal is the declaration of the dividends by the Underground group of railways, these declarations being due on Thursday, July 7th. It may be recalled that a year ago the interim dividends on Districts, Metropolitans and City and South London were all 1½ per cent. For the full year Metropolitan paid 3 per cent., District 3½ per cent., and City and South London the same as Metropolitan. It is considered likely that the District will advance its interim dividend to 2 per cent., and possibly pay 4½ per cent. for the year. Some optimists talk about 5 per cent. On Underground Electric Railways ordinary shares, no interim dividend has been paid, but for last year a maiden 1½ per cent. was distributed. The market looks for a repetition of this rate as an interim dividend to be announced this week, and, as we mentioned before, there are hopes of a 4 per cent. dividend for the full year.

Effect of the White Tragedy.

These dividend anticipations have already been discounted in the market quotations, and consequently there are no appreciable changes on the week. A mild speculative account has been built up in these stocks, and speculative markets as a whole have been somewhat influenced by the sudden death of Mr. James White at the end of last month. This was followed by a certain amount of liquidation. Mr. White had a finger in so many businesses as to render it difficult to estimate how far the ramifications of his deals might be found to extend, but this had no more than an indirect bearing upon the Undergrounds. In order to pay for losses incurred through the slump in British Controlled Oilfields shares, due to Mr. James White's sudden death—losses that fell upon a wide circle of the community—other stocks and shares have had to be realised, and the endeavour to get out of these is still a factor which operates for keeping down the prices, to some extent, of stocks and shares with which the dead financier had no connection whatever.

Safety First.

The Wareham Electric Supply Company has gone into liquidation, and the Official Receiver had biting things to say at the statutory first meetings of creditors which were held a few days ago. The Official Receiver did not mince matters in giving his opinion of the operations of Colonel Eaton, who was connected with various companies in this particular group. We ourselves have had equally unpleasant things to say concerning the highly undesirable character of the various electrical preference and debenture issues made under the auspices of Sir Charles B. H. Soame, Colonel E. Eaton, and Major James Brigden. The financial history of the various companies connected with this group makes an unsavoury story in the development of electricity over comparatively small areas. It is to be feared that the people who have lost money are mainly of the class which, whilst ill able to afford such losses, rarely see the pages in which warnings are raised.

Ex Dividend Markings.

The prices of a good many stocks and shares have been quoted ex dividend during the past few business days, and amongst home electricity companies this applies to the preference shares of the County of London Electric, the Metropolitan, and the Notting Hill companies. Notting Hill preference have regained the deduction, remaining at 10¼, and

County preference are left unchanged at 22s. 6d. x.d. Of the ordinary shares, Edmundsons are better at 31s. 3d. The yield on the shares has now declined to 5¼ per cent. on the money—a modest return which raises a hope that the distribution will be increased next year, following upon the advance of 1 per cent. in the dividend declaration this year. The St. James' and Pall Mall Electric Lighting Company has declared an interim dividend of 6d. per share on the ordinary, payable on July 30th. The interim dividend a year ago was 5 per cent. on the old capital. The increase in the ordinary shares was made in November last. Scottish Power ordinary strengthened to 26s. 6d., and the preference to 26s.

Investment and Cable Results.

The Electric and General Investment Company carries forward a total of £44,000; the gross profit for last year was £10,800, or about £700 more than that for 1925-26. The ordinary shares are not quoted, but the company's 6 per cent. preference, of £5 each, stand at 3⅜ ex the dividend paid a few days ago. The shares last changed hands at the end of May at 73s. 9d. The Electrical and Industrial Investment deferred shares are quoted at 1s., the preferred and preference at 5s. each, these being the prices at which the shares last changed hands in the middle of May. Amongst other interesting dividend announcements of the past week, the Globe Telegraph and Trust Company has declared a final dividend of 5s., free of tax, and the ordinary at 18½ are now ex. Eastern Extensions have gone back half-a-crown. No change occurred in Eastern ordinary stock at 182½ upon definite ratification of the 30 years' concession granted by Turkey to the company.

Equipment Shares.

The General Electric Company made a profit of £1,030,000, which is about £46,000 less than that recorded for the previous twelve months. In view of the unsettled industrial conditions prevailing last year, the company must be congratulated upon the management which achieved so satisfactory a result in so difficult a time. The price of the shares remains at 29s. 6d. Siemens have further weakened to 25s., and Johnson and Phillips have been dull in consequence of the unfortunate developments that have occurred in connection with Burndept Wireless, in which Johnson & Phillips have an interest. British Insulated ordinary are a good market, and, with British Aluminium ordinary, show a rise of 9d. a share. The manufacturing group is firm. There is a good deal of business doing in the popular shares.

Interchange of Data.

Callenders at 3 9/16ths are ¼ better on the meeting, at which the chairman, Sir J. Fortescue Flannery, and, following him, Sir Tom Callender, made speeches as satisfying as they were satisfactory. Further information was given in regard to the interchange of data between some of the manufacturing companies. Callender's, Henley's and British Insulated are working along these lines of interchange, and Sir George Sutton, at the Henley's meeting, dwelt upon the same theme. Henley's shares are ¼ up at 4⅞. The heaviness of Johnson and Phillips is being, perhaps, a little overdone. The dividend decline caused disappointment, but so far as the Burndept business goes, this may not be such a bad thing in the long run for Johnson & Phillips.

Foreign Traction Issues.

Anglo-Argentine Tramways first preference have weakened a shade. Sir George Touche, at last week's meeting, gave some idea of the company's difficulties when he pointed out that a passenger on its lines could travel nearly nine miles for about twopence. The fares are fixed by the terms of the Anglo-Argentine Tramways concession, but the omnibus companies have petitioned for a revision of their own scale, and it has become necessary, in view of the growth in expenses, for the tramways to be allowed to raise their rates. The Mexican Utility group is rather dull, Mexico Tramways Fives having declined to 80½. Brazilian Tractions gave way to 158, rallying to 160, at which the fall on the week is 3 points, and the preferred shares are 1½ down at 132½. Colombo Tramways Fives at 102½ are 13 points higher.

South American Telephones.

United River Plates, ex 5s. net dividend, show 1/16th fall at 10 7/16ths, though the market in the shares remains very hard considering the character of the previous long rise. Bogota Telephones are ex the rights to the new shares offered at 25s. The latter stand at 3s. 6d. premium, and the old Bogotas at 32s. 9d. Venezuela Telephones at 27s. 6d. have shed a shilling. Pennsylvania Water and Power capital stock at 50½ has gained 2, but the other dollar issues show no particular variation.

In the wireless section, Marconis receded to 18s. 9d. Marconi Marines dropped back to 25s., recovering to their previous level of 26s. 3d.

Miscellaneous.

British Electric Tractions are not quite so good as they were. Iron and steel shares have gone back a trifle. The rubber market gives further ground for disappointment in the renewed dwindling of the price of the produce. The present, Mid-July, account is likely to prove a somewhat uneasy time for Stock Exchange markets, and there will be a general feeling of relief when the pay-day, July 14th, is over.

Share List of Electrical Companies.

	Nom. £	Dividend. 1925.	Dividend. 1926.	Price July 4 1927.	Rise or fall.	Yield. p.c.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	14	14	59/6	—	4 14 1
Brompton Ordinary	1	10	8⅝	25/-	—	5 12 0
Charing Cross Ordinary	1	15	8½	25/6	—	5 12 0
do. do. 4½ Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	12	8⅝	25/-	—	5 12 0
City of London	1	15	10	27/-	—	7 8 2
do. do. 6% Pref.	1	6	6	22/6	—	5 6 8
Clyde Valley	1	8	8	30/6	—	5 5 0
County of London	1	15	7½	28/-	—	5 0 0
do. do. 6% Pref.	1	6	6	22/6xd	+6d.	5 6 8
Edmundson's Ordinary	1	7	8	31/3	+1/3	5 2 5
do. 7% Pref.	1	6	7	24/-	—	5 16 8
Elec. Supply Corporation	1	10	10	32/-	—	6 5 0
Kensington Ordinary	1	15	8	25/6	—	6 5 6
Lancs. Light and Power	1	7½	7½	26/-	—	5 15 5
London Electric	1	10	8½	24/-	—	5 16 8
do. do. 6% Pref.	5	6	6	5⅝	—	5 6 8
Metropolitan	1	11	8	29/-	—	4 16 7
do. 4½% Pref.	1	4½	4½	17/-xd	+3d.	5 8 6
Midland Counties	1	5½	6	22/6	—	5 6 8
Newcastle-on-Tyne Ordinary	1	7	5	22/6	—	4 8 6
do. 5% Pref.	1	5	5	17/6	—	5 14 3
do. 7% Pref.	1	7	7	24/6	—	5 14 3
Notting Hill 6% Pref.	10	6	6	10½xd	+½	5 17 1
North Met. Elec. 6% Pref.	1	6	6	22/-	—	5 9 1
St. James' and Pall Mall	5	17½	8	25/6	—	5 9 10
South London	1	15	8½	25/-	—	5 12 0
South Metropolitan Pref.	1	7	7	1¼	—	6 3 0
Urban Ordinary	1	7	7	25/-	—	5 12 0
do. 6% Pref.	1	6	6	1⅛	—	5 13 0
Westminster Ordinary	1	15	8½	24/6	—6d.	5 14 3
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	20/9	—	7 4 7
Yorkshire Elec.	1	8	8	30/-	—	5 6 8
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	71	—	5 12 8
Metropolitan	,,	5	3	58½	—1	5 2 7
do. District	,,	9½	9½	65	—1½	5 7 8
Underground Electric	£1	Nil	1½	19/-	—t.d.	1 11 7
do. do. Income	Bonds	6	6	102	—	*5 17 8
TELEGRAPHS AND TELEPHONES.						
Anglo-Am. Tel. Pref.	Stock	6	6	101½	—	5 18 3
do. Def.	,,	1½	1½	24½	—	6 1 5
Automatic Telephone	1	8	10	47/6	—	4 3 6
Chili Telephone	5	5	6	7⅝	—	3 17 5
Eastern Extension	10	10	10	18⅝	—¼	*5 6 8
Eastern Tel. Ord.	Stock	10	10	182½	—	*5 9 7
Globe Tel. and T. Ord.	10	10	10	18½xd	+½	*5 7 5
do. do. Pref.	10	6	6	11xd	—	5 8 1
Great Northern Tel.	10	20	20	28½	—	7 0 4
Indo-European	25	8½	10	45½	—	*5 7 6
Marconi	1	Nil	Nil	18/9	—1/16	... ...
Marconi-Marine	1	7½	8½	27/-	—	6 9 8
Oriental Telephone Ord.	1	12	12	53/9	—	*4 9 4
United R. Plate Tel.	5	8	8	10 7/16xd	-1/16	*3 14 5
Western Telegraph	10	10	10	17⅞	—	*5 13 6
HOME AND FOREIGN TRAMS, &C.						
Anglo-Arg. Tram First Pref.	5	5½	5½	8 7/16	—1/8	8 0 0
do. do. 2nd Pref.	5	6	6	3 3/16	—	8 8 6
do. do. 5% Deb.	Stock	5	5	72½	—	6 17 11
British Electric Traction Ord.	,,	8	8	119½xd	—2	6 7 6
do. do. 6% Pref.	,,	6	6	117½xd	—2½	6 10 0
Brazil Traction	100	5	6	160	—3	3 15 0
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	90½	—	5 11 9
do. do. Preferred		6¾	6¾	120	—	5 4 2
do. do. Deferred	,,	8	8	156	+1	*5 2 7
do. do. Deb.	,,	4½	4½	80½	—	5 5 7
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/-	—	Nil
London United Tram. Deb.	Stock	4	4	51½xd	+¾	7 12 5
Mexico Trams, 5% Bonds	—	5	5	80½	—1	6 4 3
Mexican Light Common	100	Nil	Nil	43	—	Nil
do. Pref.	100	Nil	Nil	102½	—2	Nil
do. 1st Bonds	—	5	5	72½	—1	6 17 0
Yorkshire (West Riding)	1	5	—	8/9	—	... ...
MANUFACTURING COMPANIES.						
Babcock & Wilcox	1	18	18	52/6	—	4 19 1
British Aluminium Ord.	1	12½	10	43/9	+9d.	4 9 1
British Elec. Transformer Pref.	1	Nil	7	18/3	—	7 13 6
British Insulated Ord.	1	15	15	68/3	+9d.	4 7 11
Brush Ord.	1	10	10	26/3	—	7 12 4
Callenders	1	15	15	3 1/16	+⅛	4 4 0
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Ord.	1	Nil	Nil	12/6	—	... ...
Edison-Swan	4/-	10	10	10/-	—	4 0 0
do. 5% Deb.	Stock	5	5	8 1/16xd	+⅛	5 17 8
Electric Construction	1	10	7½	26/3	—	5 14 3
Enfield Cable Pref.	1	7½	7½	25/6	—	5 17 8
English Electric	1	Nil	Nil	10/-	—	... ...
do. do. Pref.	1	8	—	12/6	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/6	—	5 10 8
do. Ord.	1	7½	7½	29/6	—	5 1 8
Henley	1	20	25	4¼	+⅛	5 2 6
do. 4½% Pref.	5	4½	4½	4¼	—	5 6 0
India-Rubber	1	5	5	1	—	*5 0 0
Johnson & Phillips	1	17½	12½	2½	—	5 0 0
Met.-Vickers Ord.	1	8	8	27/6	—	5 11 4
do. Pref.	2	8	8	2⅝	—	6 14 9
Siemens Ord.	1	7½	7	25/-	—1/16	6 0 0
Telegraph Construction	12	10	10	28½	—	*4 4 2

* Dividends paid free of Income Tax.

The Electrical Contractors' Association.—II.

Convention at Scarborough.

Estimating and Costing for Electrical Contractors.

By J. KIRKHAM (Rawlings Bros., Ltd.).—(*Abstract.*)

The author of this paper asserted that as a consequence of the initiative, foresight and acumen displayed by many prominent men connected with electrical contracting, estimating and contracting now occupied a clearly recognised place in the industrial life of the country Unless the estimating department functioned to the satisfaction of both the contractor and his client, a continuous flow of repeat orders could not be looked for. A profit was anticipated on all work carried out, and only by correct estimating was it possible to judge in advance the probable net result of any one job. Estimating must necessarily precede costing for a job; but the processes were very closely allied, and to achieve the maximum of success the two departments must co-operate at all times to the fullest possible extent. There might be some contractors who had not regarded costing as a subject of first class importance. In the days when competition was less acute than it was at the present moment it was possible to put in a price which would cover the actual cost of the job and allow a fair measure of profit. With the advent of increasing competition, however, uncertainty arose. In the absence of previous business statistics the contractor might have found at the end of the year that the accounts disclosed that his "profits" had almost reached vanishing point owing to administration costs being higher than anticipated. Equally, of course, the year's accounts might have shown far greater profits than were anticipated! That prompted contractors to evolve reliable systems of costing whereby estimates were based on facts and figures rather than upon "judgment" alone. Even in these highly competitive days, however, there were contractors who appeared to be satisfied with a knowledge of the "gross profit" on a job. By means of an adequate system of costing, however, all the expenses of a business were properly distributed and added to the more obvious "prime costs." Only in that way was it possible to fix a selling price capable of producing a profit and meeting healthy competition. An adequate costing system also provided valuable information for general business purposes. Double entry accounting would disclose quite accurately the net results of any business taken in the aggregate, but the system might still be entirely fallacious. The turnover of a contractor's business might be equally divided between large contracts and general jobbing work, and, in the aggregate, the results might yield a substantial net profit. *Prima facie* evidence would indicate that all was well, but a true analysis might disclose the fact that some of the business had been executed with a very little profit, or at less than net cost.

When work was executed on which the contractor did not get a return commensurate with his efforts, apart from himself, the industry generally had also suffered. In all probability other contractors had been invited to tender for the same work, and, in making reasonable tenders, had expended a very large amount of time and money. Here the author told the story of a contractor who had submitted an abnormally low tender for work at a public institution. Since a very grave error had obviously been made, the committee considering the tenders requested him to re-examine his costs and withdraw his tender if he desired. In due course, a reply came thanking the Committee for the opportunity. On re-checking his figures, the contractor regretted to say that he had tendered at a price 10 per cent. *higher* than he intended, and expressed the hope that the Committee would place the work in his hands at the amended figure.

A costing system was more easily applicable if the business was entirely one made up of large work. Where the turnover was partly jobbing work, the costs had to be more carefully allocated. He divided costing in the electrical contracting industry under three headings: Direct costs, works on-costs, and administration on-costs.

The first item naturally included all the direct labour employed and materials used. It would also embrace specific expenses chargeable to a particular job, while the stores department would make a debit charge on each job for all goods issued from the contractor's own stock. It should be the duty of the man in charge of stores to see that all goods issued were properly recorded. The prices to be charged to the job should be the market prices of the day. Odd pieces returned to stores should not be credited back at the same price as they were charged out originally to the job.

"Works on-costs" were very difficult to define, and would vary according to the nature and size of the business. The author suggested that the salary and expenses of the supervising manager, the draughtsman and the estimating clerk, the buyer and his staff, the storekeeper and his assistants, and all foremen should be included under the heading. The following items should also be included: Depreciation of plant and loose tools; National Health, Unemployment, and third party insurances; and the maintenance of delivery vans, trucks, &c. Those costs should be distributed over all the work in accordance with the percentage which they bore to the whole wages. That could be done either weekly, monthly or quarterly, depending upon how often the contractor desired to render accounts to his customers. "Administration on-costs" gave rise to the most trouble, for many and fluctuating were the expenses that fell upon all business undertakings. Some of them were non-recurring; but under the heading he would include all other charges of every description, not previously enumerated. The amount of administration on-costs could be expressed only as a percentage. The rate to be charged would vary considerably with each business, and would decline with an increased turnover and increase with a declining turnover. He would recommend that those on-costs should be ascertained by taking the ratio of the average expenses to turnover, over a period of from three to five years. It might be found advisable to sub-divide the "works on-costs" and "administration on-costs" by collating such of them as referred to small jobbing work and distributing those costs to the small jobs quite separately from the costs for the whole of the business. The specific expenses incurred in executing jobbing work could only be determined by the individual contractor.

An alternative method for calculating administration on-costs was to find the percentage which that charge bore to the total cost of "direct labour." For example, if the total administration on-costs amounted to 60 per cent. of the direct labour cost, then 60 per cent. of the direct labour costs on any one job was added to cover the administration on-costs involved in the same work. The first-mentioned

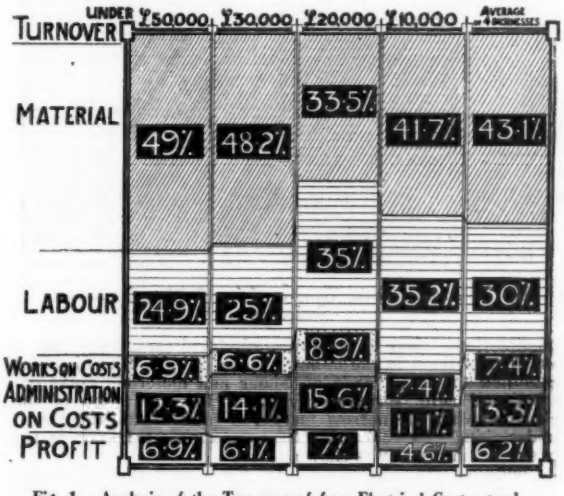


Fig. 1.—Analysis of the Turnover of four Electrical Contractors' Businesses.

method (ratio of expenses to turnover) was simpler and reliable and capable of annual adjustment. A competent man in each business should be instructed to review the situation annually and advise the costing department as to what percentage should be adopted in the next period.

An up-to-date system of costing enabled the contractor more readily to determine the class of work which his organisation was best equipped to undertake. Many contractors were disposed to make a special effort to obtain a contract when work was slack, often cutting down profits to secure the end in view, or to find full-time work for their employés. On economical grounds, however, a period of abundant work was the most profitable time to make a cut in prices, in order to secure any particular contract or to establish business relations with a new client. With an expanding turnover, such a cut had far less effect on the business as a whole, since administration expenses were spread over a greater volume of trade.

The method of stocktaking was of the highest importance, and due regard should be taken of the state and tendency of market prices at the time. Obsolete stock should be written down unsparingly, and any loss arising under this head was one to be suffered by the stores. Materials should be priced at cost or market value (if the latter was the lower). Any appreciation in value should be entirely ignored. Arithmetical calculations concerning stock should be accurate; the author had known stock to be rushed through, and accuracy sacrificed to speed. There was a story of a contractor who found that he had done so well that he gave the whole of

his employés a dinner, only to find subsequently that his clerk had included the "Year of Grace" in the additions of the inventory of stock.

With regard to work in progress, it was of the utmost importance that all big contracts should be separately valued, due attention being paid to the approximate cost to complete as compared with the total contract price which the contractor would ultimately receive. It was of vital interest to the contractor that the net profits should embrace actual earnings only, whilst the contrary was the fact if the stock or work in progress had been over-estimated.

All businesses, no matter what their size might be, had some percentages of overhead charges to bear. The "small" man might sometimes collect his goods in person, work early and late, and his private residence might be turned into his office. He might also own the freehold of his premises and have no rent to pay, but in that connection he had virtually paid his rent in advance. In other words, the costs were there whether he charged them or not. The paper did not apply only to the larger type of business. Indeed, the need for an appropriate costing system was very apparent in the case of small businesses, since the risk of failure, following one or two serious losses due to faulty estimating, would be less in the case of larger undertakings. The majority of "small failures" had not entirely been caused through lack of capital. On the contrary, it could be traced to the paucity of net profit; and one was brought to the conclusion that the overhead charges had been ignored.

The paper included two charts illustrating the business costs and net profits of eight firms in active operation at the

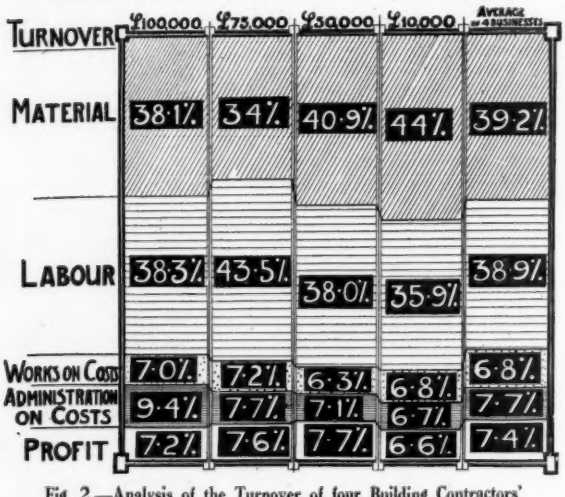


Fig. 2.—Analysis of the Turnover of four Building Contractors' Businesses.

present time. Four of them were electrical contractors (fig. 1) and four of them in the building trade (fig. 2). The diagrams exhibited the direct costs of labour and material, works on-costs, and administration on-costs, a further section of the chart showing the narrow margin of profit obtained by each undertaking. In each case the approximate turnover of the business concerned was shown.

Confining his observations to the electrical businesses—varying in size from a turnover of £10,000 to £50,000—the author said that if the samples were representative of electrical contracting firms in general, then an amount equal to 20.7 per cent. of the turnover (or 69 per cent. of the direct labour cost) must be added to the total of the direct cost of labour and material in order to arrive at the complete cost of any work. After that had been done, only 6.2 per cent. on the turnover remained as net profit. The percentages relative to the "on-costs" quoted were only based respectively upon the total turnover or direct wages of the four electrical businesses as a whole, and the illustrations were given to emphasise the existence and in a measure the material cost of the works and administration on-costs, all of which had to be provided before the contractor enjoyed any profit. The percentage to cover administration costs would of necessity be relatively higher in respect of small jobbing and repair work than of the larger jobs. That was illustrated by the following table prepared from information received by the author:—

	Small jobs on repairs.	All other work.
Material	50.7	45.7
Labour	23.1	26.8
Works on-costs	6.5	6.6
Administration on-costs	16.5	11.8
Profit	3.2	9.1
	100.0	100.0

It was thus seen that the percentage of works and administration on-costs on the turnover of small jobs was 23 per cent., and on other work 18.4 per cent., and, alternatively, on the direct wages the percentage of the works and administration on-costs was 100 per cent. for small jobs and 68 per cent. for other work. The profits of the building contractors were slightly higher than those achieved by the electrical contractors, while the administration on-costs of the builders were substantially lower, but the author looked with confidence to that state of things being reversed in the near future.

Discussion.

Mr. W. R. RAWLINGS opened a brief discussion of the paper, stating at the outset that although he was connected with the author in business he had had no hand in the preparation of the paper. Mr. Kirkham was not an electrical man but he knew when a "profit" was a profit and when it was a loss. The speaker thought that careful attention to the points in the paper would lead to fewer journeys of electrical contractors to Carey Street. The "little" man had really more expenses than the large business, although he did not realise it. He should remember that members of a family whom he employed could be working elsewhere and he should include the cost of their work in his charges. If he did that he would be able to do better work, make a better profit, and do away with foolish price-cutting. The London Committee had recently produced a schedule of day-work prices in which 15 per cent. was added to the cost of material and 44 per cent. to labour. Working on those figures, according to the chart, would result in a net loss of 2 per cent. To earn a profit the labour charge would have to be raised to 50 per cent. He noticed that builders had lower administration charges and made a better profit. That was probably due to the fact that they had less supervision and smaller risks. The Northern Section had issued a price schedule which allowed for 50 per cent. on material and labour; that should show a handsome profit. To secure the same profit, while keeping the material rate at 15 per cent., the London labour percentage would have to be raised to 60 per cent. The Office of Works often provided material and left the labour and risk to the contractor. In such a case the labour rate would have to be 70 per cent. He concluded by hoping that the London Committee would learn a lesson from the paper.

Mr. C. H. FLOWER said that he would like to know whether the charts were really representative; they showed a ratio between material and labour of 66⅔ and 33⅓. From his own experience, for three years the figures were:—52 to 48; 41 to 59; and 45 to 55. He would like to hear other views on the subject. Thus a different complexion might be put on the London day-work rates which had been attacked by Mr. Rawlings. The matter had been given careful consideration on the basis of definite figures, showing a ratio of 45 to 55; that gave a gross profit of 32 or 33 per cent. The Office of Works system was followed by some architects who stipulated 10 per cent. on material and 15 per cent. on labour for extra work, which was absurdly inadequate and could only result in a loss to the contractor. A draft quarterly trading or profit and loss account was invaluable. It was often difficult and costly to check stock and it might not be worth while to maintain a card index. He made a practice of checking certain items at intervals.

Mr. H. MOSS expressed his approval of the spirit of those who had provided the figures for the charts. He himself was a "small" man, but he thoroughly realised the importance of careful analysis of costs. The relative proportions of labour and material varied considerably. In time of good trade, when an amount of large plant was installed, the labour proportion was smaller. Those who did not employ proper costing methods were a danger to the whole industry. He was glad to say that the tenders of E.C.A. firms varied only to a small extent, which showed a healthy state of affairs.

Mr. W. CROSS complained that the author had said very little about estimating. He had stated that in every case the price quoted should be based on definite on-cost figures, but that could not always be done in practice. Work-in-progress costs should be put at the prime-cost value of the job at the end of the year when the balance sheet was prepared. He commended the methods adopted by the Admiralty during the war in connection with electrical contracts. Such a system ensured an adequate profit. There was no doubt that attention to the points enumerated in the paper would lead to a diminution of the price-cutting which was so prevalent.

Mr. KIRKHAM, in his reply, said that he did not agree with Mr. Rawlings that the loss incurred by using the London day-rates would be as much as 2 per cent.; 1.1 per cent. was the figure. To produce a profit the labour charge should be 68 per cent. and not 50 per cent., as suggested by Mr. Rawlings. He agreed that businesses varied considerably, but considered that his charts were representative. He had not said a great deal regarding estimating for he felt that members knew far more about that than he did.

Electrical Showrooms.

By H. E. WALKER (Walker Bros., Birmingham). (*Abstract.*)

The full title of this paper was "The Electrical Showroom as a Commercial Proposition and its Relation to the Industry," and it was written to stimulate the interest of electrical contractors in the showroom side of their business. In his opening remarks the author said that there was ample room for immensely increased business effort in every section of the industry. His own prescription for immediate application would include: The reduction of the cost of energy to

an absolute minimum; the increased electrical education and conversion of the public; and the development of all possible harmony within the industry itself. It was vitally urgent that the cost of any given electrical service should not be substantially greater than the alternative services that were available to the public and already well established. Until electricity could compete on favourable terms with those alternative services, the task would continue to call for abnormal effort on the part of all concerned. The first cost of an installation or of a piece of equipment might be regarded as representing "one payment," while the running cost, in the shape of quarterly bills, was a "recurring payment." Assisted wiring schemes and easy payment arrangements were entirely appropriate, always bearing in mind that the cost of wiring and equipment for one class of consumer should not be placed on the cost of energy to the general community.

Without persistent public advertisement and demonstration, little or no electrical progress could be looked for; very big work in that direction had been carried on by the Electrical Development Association during recent years.

No more important result was achieved by the recent "W.O.B." campaign than the greatly increased feeling of respect and harmony engendered among all members of the industry by the active "electrical circles. One purpose of the paper was briefly to touch upon the relations that should exist between the interdependent sections of the trade so far as display centres were concerned and to demonstrate that showrooms, under proper ownership, control and direction, were of vital importance to the welfare and progress of the whole electrical community. The supply and distribution of electricity represented an enormous work and serious responsibility for those engaged in it, and those cares should not be added to by setting up installation departments or competitive sales organisations. All expenditure on other matters than those involved in the perfection and cheapening of the supply should be the subject of most careful review. Every supply authority must have central offices, and it might be urged that no member of the public should be permitted to come into personal touch with the supply authority and fail to absorb some electrical idea as a consequence of his visit. On the other hand, to turn central displays into competitive sales organisations, thereby discouraging private enterprise in the area, was an unsound policy. Supply authorities would be well advised to concentrate on central displays calculated to demonstrate the growth and popularity of the main service provided. The display would become a centre of education and suggestion rather than a purely competitive shop, and would thus serve the best interests not only of the supply undertaking itself, but of the industry as a whole.

The problems presented by manufacturers' and wholesalers' showrooms were less complicated. Such display centres were established, at least presumably, for the benefit of the manufacturer or wholesaler concerned and the trade. If a manufacturer or wholesaler failed to support the trade in every reasonable way, then the general body of contractors and retailers possessed a powerful remedy. Although the central principles were well defined, there was room for discussion and agreement on the detailed trading procedure to be adopted by such establishments, and all parties should get together in order to arrive at definite understandings on the minor points still outstanding.

Electrical contractors were the proper individuals to organise the increased number of retail electrical showrooms that would be called for as the industry continued to develop. As ordinary private traders, electrical contractors were in daily touch with the general public. The electrical contractor must be in a position to supply the electrical needs of the public in a manner that was both convincing and satisfactory, and a properly organised electrical showroom represented one of the most effective ways of doing this.

The paper next dealt with the general organisation of public electrical display centres. To take more or less suitable premises, to hang a miscellaneous collection of fittings from the ceiling, and to cover the floor with an equally miscellaneous assortment of current consuming devices in general, was not to establish a showroom, in any proper sense of the term. The function of the showroom and its vastly important window space was to appeal to, instruct, and convince the public. The "Electric Home" exhibitions during recent months had demonstrated the need to show electrical apparatus fitted up for use and installed in appropriate surroundings. Only by such practical displays was it possible to stage an instructive and convincing appeal to the public. It was self-evident that every showroom could not represent a complete electric home even in miniature; but a very great deal might be done within the most limited space. It was at least possible to have some measure of order in the display even of simple fittings. It was singularly unwise to have a kitchen pendant so displayed that the bedroom fitting immediately by its side was thrown completely out of focus. Even in the smallest showroom it was possible to arrange kindred fittings in ordered groups, and allied apparatus in reasoned assembly.

The author directed attention to a showroom plan reproduced in an article contributed in October last to the ELECTRICAL REVIEW by Mr. W. E. Bush, of the E.L.M.A. Lighting Bureau. The plan was reproduced with the paper; and it demonstrated the common sense value of the ordered displays already referred to. By means of simple partitions, various parts of the showroom were set aside for kitchen, dining-room, bedroom and other collective displays of appropriate fittings and equipment; while, by means of smaller showcases or alcoves, particular fittings or equipment might be isolated and thus develop their maximum individual appeal.

The showroom equipment should include a suitable "lamp bench" for the display and instantaneous lighting-up of all the lamps available for sale. That was the only way to sell "colour lighting." Adequate arrangements must also be made for the display of glass and silk shades. There, again, the possibilities of colour lamps were not to be overlooked.

Bearing in mind the class of customer to be found in the area, the stock best suited to their needs should be selected. Very few people could afford to be interested in "period" equipment. The idea of variety rather than quantity should be kept well to the fore. Every article should be priced in plain figures, and the running cost per hour clearly indicated. It should be possible to put every fitting or appliance into immediate operation with as little fuss or preparation as possible. Discounts should never be allowed to those who were not entitled to them.

The showroom window represented the best and most paying type of public advertisement an electrical contractor could arrange. It was essential to arrange really arresting displays if the full advertising value of the window was to be developed. The all-important electrical display window must be second-to-none in the matter of its attractive lighting. How could good shop-window lighting and after-closing-hour lighting be sold to other retail traders unless the effects were demonstrated in those windows?

It was useless to have good premises, and a well-bought and arranged stock, if the human service was weak. Those who essayed to serve customers must be thoroughly conversant with the goods, their advantages, and their practical use. Such information must be forthcoming with little or no hesitation. Personal knowledge of the everyday use of electrical apparatus was, of course, invaluable experience for all showroom assistants to possess, and ways and means must be found to secure their practical education in that direction. Assistants should never "overstate the case" or deceive a customer in any manner whatever.

Concluding, the author said that he would devote no more than a single paragraph to the electrical showroom "as a commercial proposition." The showroom must put up an instructive and convincing appeal to the public. But, at the same time, the establishment must be made to remunerate the owner. In order to achieve that, the trader must have the measure of trade fair play to which reference had already been made. Given that essential foundation, the success of the retail showroom would depend almost wholly upon the individual efforts of the showroom owner himself. By attention to the points mentioned in the paper, and with a competent staff to deal promptly with erection and maintenance, the electrical showroom was a commercial proposition

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Discussion.

Mr. J. ORRINGE emphasised the fact that showrooms should be designed to educate not only prospective consumers but also the existing ones. At an earlier date he had given it as his opinion that the establishment of showrooms was the duty of the installation engineer. He now considered that contractors should co-operate with the supply authorities as had been done at Leicester for the past three years. The supply department had only one full-time canvasser, he believed, whereas the 100 contractors in the town were all assiduous canvassers. The relations at Leicester were very good; the only danger was the probable changing of the *personnel* of the Electricity Committee. If views were constantly exchanged between the contractors and the Committee and they realised each other's difficulties, relations would remain harmonious. The author should have explained that the trade discount given by the municipal showrooms to contractors was not all profit. If the cost of energy was high great difficulties would result. The E.D.A. had done excellent work and the circles had been of great benefit to the industry; they should be maintained and should hold regular meetings. He was convinced that Mr. Walker's ideas could be beneficially applied in large centres; in smaller towns, however, the establishment of showrooms by contractors would prove unremunerative. In Leicester they sold everything at a profit except lamps, upon which the discount was inadequate. He considered that that was a matter which the Association should take up.

Mr. R. ROBSON said that Mr. Walker's own showroom was one of the finest that he had seen. With a two-part tariff giving a rate of 1d. or ½d. per kWh they would be able to sell plenty of appliances. Cheap appliances should not be kept; it should be the aim to stock standard lines for which replacements could be easily obtained. There was no doubt that the "easy-payment" system of purchase would continue to expand. Most contractors were not in a position to finance the system; they would have to place the business in the hands of finance organisations. The E.C.A. was considering the matter, and perhaps might eventually provide a financing organisation. While he realised that the E.D.A. Campaign had produced excellent results, he did not agree with the methods of advertising—he considered them too "high-brow." What the industry wanted was an "electrical character" which would make a popular appeal. Sales of appliances were not the only consideration in the running of showrooms; the

sale of installations might easily be more important. Window space should be used to the best advantage and manufacturers' displays should be contingent upon the chances of selling their appliances in the district. When the supply undertaking instituted a scheme for wiring small houses the contractor should make a display of the less expensive appliances. Discounts should never be mentioned to private individuals in showrooms. Suppliers should give special rates for energy used in showrooms.

Mr. L. E. BUCKELL (G.E.C.) said that the sale of appliances could not go on properly unless effective methods were pursued to bring electricity before the public. The position in some of the smaller towns was very bad. The vital question was not necessarily cheap energy or cheap installations; more would be done by the supply of efficient apparatus. That was where the supply authorities held the lead; they adopted the "service" point of view and they kept appliances in order. The electric circles had had a big effect in bringing about co-operation, but the Electricity (Supply) Act had done more; it would be an important factor in future progress. The contractor could do well in a big town if he had a good business and reasonable capital. The smaller towns, however, were the best field for development. Competing contractors in a town should combine—at least to run a showroom if not to run the whole of their business. Much was to be learned from other trades as to the methods of running a showroom. Concluding, Mr. Buckell said that electrical service appealed primarily to women. Therefore, the showroom should be arranged and carried on with the help of women assistants and demonstrators.

Mr. A. SHELTON, stating that he was not a member of the E.C.A., said that he was amazed at the number of contractors' showrooms in some of the large Yorkshire towns, and stated that there were 420 contractors on the Manchester Electricity Supply Department's books. A third of that number of showrooms would be unremunerative. Why should not contractors co-operate with the supply authority as at Leicester? Many other municipalities would welcome such a scheme. The pooling of contractors' businesses was worthy of consideration by the Council of the Association. It was the practice of some authorities to run special weeks for various phases of electrical service; the E.D.A. could assist by sending skilled lecturers and demonstrators. The whole question should be considered jointly by the Association and the I.M.E.A.; much good could be done in that way for the industry and the community as a whole.

Mr. T. E. ALGER said that he pleaded for municipal showrooms where they were necessary, but they should not be opened where suitable contractors' showrooms already existed. If a contractor could not afford to open showrooms it could be done by co-operation with the supply authority. He certainly objected to an authority deciding against opening a showroom and finally doing so when a contractor had opened one. Some municipalities would not only not increase their trade by opening showrooms, they would actually reduce their profits. There were broad-minded (as well as narrow-minded) men in both the E.C.A. and the I.M.E.A., and if they got together co-operation could be arranged on the right lines.

Mr. WALKER, in replying, agreed as to the importance of the education of the consumer as distinct from the prospective consumer. He still maintained that cheap energy was the first consideration.

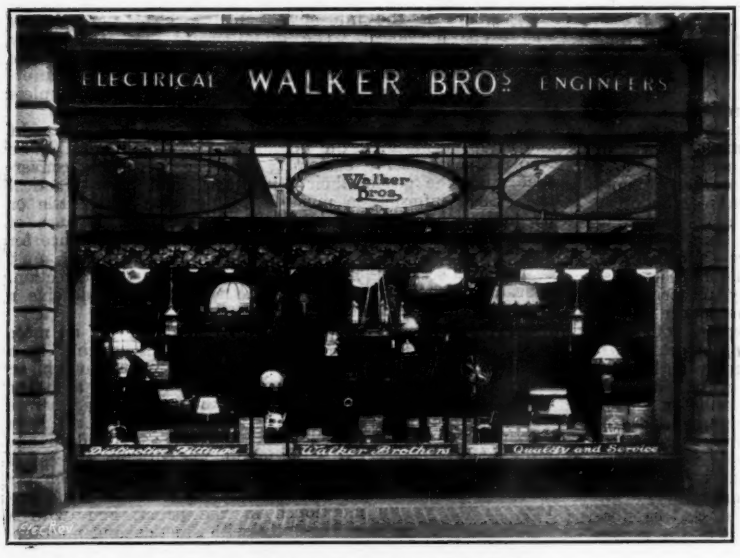

Fig. 1.—Messrs. Walker Bros.' Show Window.

Messrs. Walker's Showrooms.

A PROOF that Mr. Walker was fully qualified to write the paper upon contractors' showrooms, which is abstracted above, is provided by the two views of Messrs. Walker Brothers' showrooms at Temple Row, Birmingham, which we reproduce herewith. The first illustration (fig. 1) shows the very attractive show window of the premises. In consonance with the accepted modern practice, the window, although a large one, contains only a few articles typical of the stock, and these are arranged to good advantage. Each fitting or appliance is plainly marked with its price, and the card also bears a very brief description where necessary. Thus, while the toasters are obviously toasters and bear just the price, the kettle in the left-centre foreground is an accident-proof pattern, and this is stated. The window has a plain but handsome background, while the exterior is not over-decorated.

Fig. 2 is an interior view showing that while a host of fittings is to be seen, these are not overcrowded or bewildering. Lighting fittings of all kinds and for any situation are displayed, and form the principal part of the exhibition. There are also numerous examples of electric fires placed in appropriate positions, and good examples of the many domestic appliances which are available. The centre showcase is a useful structure for the display of a number of special lighting fittings, &c., and on tables in the showroom are placed pamphlets dealing with the employment of electricity for domestic purposes for the education of visitors.

While such an excellent display is beyond the reach of the majority of electrical contractors, there is no doubt that the ideas embodied in it could be successfully employed by others on a scale depending upon the magnitude of their capital or business.

Fig. 2.—The Interior of Messrs. Walker's Premises.

The Institution of Mechanical Engineers.

Works visits in connection with the Summer Meeting this year at Birmingham.

The G.E.C. Witton Works.

IN connection with the annual summer meeting of the Institution of Mechanical Engineers at Birmingham, a large party of members visited the Witton works of the General Electric Co., Ltd., on June 29th, when a general idea of the principal classes of apparatus produced and the lay-out of the works was obtained. The most important departments occupy over 35 of the 120 acres to which the Witton site extends.

Fig. 1.—Switchgear Assembly Bay at G.E.C. Works.

The main engineering works is centrally situated, immediately adjacent to the foundry. It consists of a series of extensive bays 400 ft. in length, and is devoted to the construction of heavy electrical machinery, including turbo-alternators, generators, and convertors. A feature of the equipment is a boring mill which weighs 72 tons and can accommodate a casting 12 ft. 6 in. in diameter.

The standard motor works lies immediately to the south of the main engineering works, and is laid out for the production of standard "Witton" motors of up to approximately 100 h.p. It comprises three 300-ft. bays. A striking contrast to the heavy-engineering works is offered by the small-motor and fan works. This contains a range of automatic machinery for the rapid execution of the processes involved in the production of small standardised parts.

The transformer works is divided into sections for coil-winding, fitting, assembly and testing, and is equipped with its own impregnation and oil-purifying plant.

The switchgear works is claimed to be one of the largest in the country devoted exclusively to the production of switch and control gear; it is 500 ft. long and 250 ft. wide. Its products embrace every class of modern switchgear, including h.p. cubicle switchboards for the largest modern power stations, and simple knife switches and house-service cut-outs. It is arranged in seven bays, four of which are devoted to the erection of switchboards; fig. 1 shows one of these assembly bays. A complete range of process shops for buffing, plating, enamelling, and so on, renders the switchgear works entirely self-contained.

The carbon works is claimed to be the only one of its kind in the British Empire, and is devoted chiefly to the production of carbons for searchlights and kinematograph projector lamps.

The foundry covers approximately two acres, and is capable of producing all the castings required in the works, ranging from turbo-stator castings weighing over 50 tons to such small items as brackets for fans and fractional horse-power motors.

The development department is housed in its own building, at some distance from the various works. It is fully equipped for the investigation of all works problems. Included in its sub-departments is a well-equipped electrical laboratory. In order to meet the heavy demand for power by the workshops and testing departments, there is a power house equipped with two 1,500-kW turbo-alternators, one 500-kW d.c. turbo-generator, and four 750-kW rotary convertors.

Within a few hundred yards of the works towards the north-east boundary of the estate stands the "Magnet" Club, which forms the centre of the social and athletic life of the staff and workpeople of the whole of the Witton works. The building contains a very spacious entertainment hall, staff and works dining rooms, an electric kitchen, billiard room, gymnasium, and so on.

During the tour round the works, the interest of the party was attracted by the constructional works of two 37,500-kVA turbo-alternators for the new Hams Hall station of the Birmingham Corporation. Other large turbo-alternators at present in course of erection in the main engineering works include the fourth and fifth 22,500-kVA turbo-alternators for the Nechells power station, and similar machines for the supply authorities of Portsmouth, Shoreditch, Cardiff, Adelaide, and Woolwich.

The B.T.-H. Rugby Works.

On July 1st, according to programme, a visit was made to the Rugby works of the British Thomson-Houston Co., Ltd., which may be described as the centre of operations of the company. The works are situated adjacent to the main line of the L.M. & S. Railway. The building scheme has been carefully planned with a view to facilitating the continuous progress of the work through the various departments. More than 50 buildings are included in the factory, and the main shops run north and south on both sides of a central avenue which runs east and west, the distance between the east and west gates being about 370 yards. Easy transport of the heavy goods is obtained by means of a standard-gauge railway which runs along the principal avenues and into the larger shops and stores, and light goods are transported about the works by means of mobile electric trolleys and a narrow-gauge rail system.

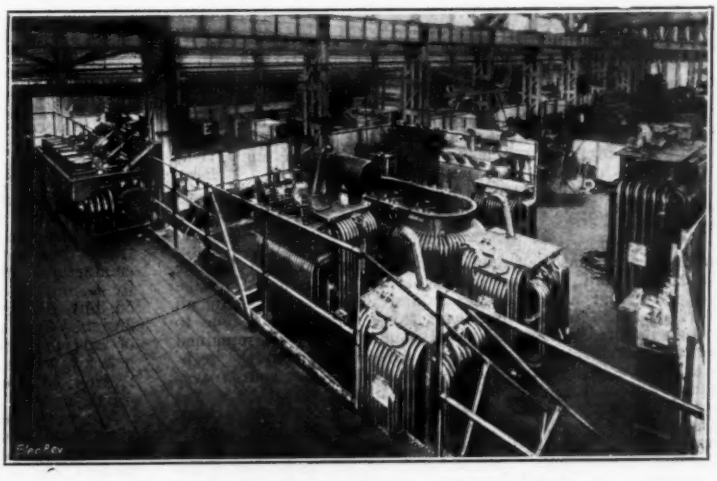

Fig. 2.—Transformer Testing Department at B.T.-H. Works.

The works are mainly devoted to the manufacture of turbo-alternators, rotary and motor convertors, motor generators and other heavy-type machinery, but the important Mazda

lamp and B.T.-H. radio valve factories are also part of the main works, which now extends over 90 acres and has a total floor space of 1,250,000 sq. ft.

Probably the most impressive buildings are those devoted to the various stages in the manufacture of large machines, particularly the pattern shop, the foundry, the turbine machine shop, and rotary-convertor shop. The foundry is of particular interest. It is a three-story building, having a floor area of 43,000 sq. ft., and is claimed to be the only building of its kind in this country in which casting is carried out on all three floors. It is well equipped with the most modern plant, and is capable of turning out castings weighing up to about 40 tons each.

The largest building in the works is the turbine machine shop, which is capable of dealing with the largest turbines and generators that the railways of this country are capable of handling. The testing of the completed machines is carried out in the middle of the main bay on bases provided with condensers capable of dealing with from 35,000 to 40,000 lb. of steam per hour, while steam supplies are available at pressures up to 250 lb. per sq. in., and superheat up to 750 deg. F. A centrally situated electrical instrument room facilitates the control of all the operations on the various bases during the tests.

Smaller bays on either side of the main shop are provided with galleries in which winding, blade-machining, and other operations are undertaken.

Adjacent to the turbine shop is a second building, 1,000 ft. long, which is devoted to the manufacture of large motors, generators, rotary convertors, motor convertors, motor generators, and transformers. The general arrangement of the plant is similar to that of the turbine shop, and contains a large and well-equipped testing department. The transformer construction is carried out at the north end of this building. Fig. 2 shows the transformer testing department.

In addition to the above-mentioned departments, the visitors were conducted over many other shops, such as those devoted to pattern making, brass finishing, punching, and so on, and in one building an interesting display was seen of the finished products of the Rugby and other factories. This permanent showroom contains many exhibits of lighting fittings for every purpose, radio apparatus, magnetos, motors, control gear, switchgear, remote-control equipment, and traction motors and control equipments.

It is evident that much attention is given to the welfare of the employés.

The visiting party was entertained at luncheon by the directors of Messrs. British Thomson-Houston Co., Ltd.

Tramways and Light Railways Association—I.

The Eighteenth Annual Congress, at Bath.

The Annual Congress.

THE annual congresses of the Tramways and Light Railways Association are gradually assuming greater and greater importance. At the eighteenth Congress and thirtieth annual meeting which were held at Bath on June 30th and July 1st, about 150 members and visitors attended. As with the Municipal Tramways and Transport Association and Incorporated Municipal Electrical Association Conventions, it is becoming the practice to invite representatives of manufacturing firms to take part, and this is having its effect on the efforts at co-operation between those responsible for the operation of electric tramway systems and those who have to supply the necessary equipment.

No better centre could have been chosen for the Congress than the City of Bath, from either of the points of view of technical or general interest. On the one hand, there is at Bath a progressive company of considerable dimensions as a traction concern, while the famous beauty spots of the country around proved an asset from the social point of view, to say nothing of the famous hot springs and Roman baths in the city. Over the Congress, however, hung the shadow of the lamented death of Mr. W. E. Hardy, the late managing director of the Bath Electric Tramways, Ltd. There is no need to recall here the qualities of Mr. Hardy, but it was typical of him that he should have expressed the wish that the Congress should be as usual; that wish was carried out. At the opening of the Congress, the Chairman, Mr. C. J. Spencer, spoke in touching terms of Hardy, and silent honours were paid. Mr. de Turckheim, the Association secretary, read the paper which had been prepared by Mr. Hardy, "Some Aspects of Local Passenger Traffic," on Thursday, and on the next day Mr. A. V. Mason read a paper on "Modern Tramway Equipment."

Of the Congress and the arrangements generally, nothing more need be said than that the directors of the Bath Electric Tramways, Ltd., and of the Bristol Tramways and Carriage Co., Ltd., and also the Mayor and Mayoress of Bath all worked hard to see that everything possible was done to ensure its success from the social point of view. It remained for the officers of the Association to see that from the technical side nothing was lacking, and the wise course was adopted of having only one paper each day; even then it was found necessary to curtail the discussions to some extent. The weather was no kinder in Bath than elsewhere, but it was fortunate that the weather "cleared" somewhat towards the end of each day. On June 30th, at the invitation of the directors of the Bristol Tramways and Carriage Co., the party visited the delightful Cheddar Gorge. The following day a ride arranged around the countryside had to be curtailed, although the bulk of the party took advantage of the facilities for tea provided by the directors of the Bath Electric Tramways, Ltd., at Glasshouse. The final event on the social side was the reception by his Worship the Mayor (Alderman C. Chivers, J.P.) and the Mayoress (Madam Sarah Grand). We heartily congratulate Mr. de Turckheim and his select band of organisers on the success of the arrangements made for the Congress. During the Congress Mr. C. J. Spencer presided, in the absence of the president the Hon. Sir Arthur Stanley.

Modern Tramway Equipment.

By A. V. MASON, M.I.E.E. (*Abstract.*)

In 1922, in suburban London, we were dealing with the large bulk of surface traffic with our tramcars; in fact, the figures were 75 per cent. "tram" and 25 per cent. 'bus. Since then, instead of a co-ordinated service with our allies, the London General, the streets have been covered by independently owned omnibuses of all "hues and cries," running about without schedules, with cut fares, and, in fact, in a general game of piracy. However, in 1924, matters reached a climax, and, after the tram and 'bus strike, a Traffic Act was evolved and sanity is being arrived at. Since the Act was passed a number of inquiries have been dealt with by a committee under the Ministry of Transport, and it has been publicly declared that the tramways in London are essential and must be protected against unfair competition. We, on Mr. Spencer's companies, have tried to find out what the public needs. I will not say we have found it, but at least we have provided a vehicle as fast and as comfortable as the all-conquering omnibus, and in this way have been able to show the Minister that, given help, the tramcar is not the hopeless proposition the Press makes out.

Traffic Acts will at no distant date be as common in England as in America, and we shall have to make up our minds as to whether we shall have the omnibus, either petrol or electric, carried on rubber, or a tramcar carried on rails. Clearly the public cannot have both running about for the same passenger.

In America the intense morning peak is dealt with by means of large bogie cars, single-deck, about 50 ft. long, coupled to an equally long trailer, sometimes motored, and sometimes not. The modern car is 8 ft. 6 in. wide, loads in front, is one-ended, and always runs in one direction, turning at a terminal loop. A conductor in the centre controls the doors, and the rear part is a saloon with a circular end. The trailer has no front platform, and also loads in front, the conductor being in the centre. All the cars are controlled by a master controller and air brakes. The cars only seat 50, but, owing to their width and to the fact that they are designed for mass loading, including standing, they are capable of carrying another 100 passengers each, so that the train gets away with 300 passengers at the peaks; at the slack times it drops off the trailer. The single-deck is very attractive for quick loading and unloading, but takes up too much room.

We have built for peak traffic. It is an ordinary L.C.C. type double-deck bogie car, fitted with 50-h.p. motors and air brakes, coupled to a single-deck car, fitted with 40-h.p. motors, and controlled by one main controller at either end of the combination; air brakes are provided on both cars. We tried this first with two large cars coupled, fitted with magnetic brakes, but it was difficult to get a brake worked from either end that would hold both cars when at a standstill. The large car carries 73 passengers seated, with standing room for ten, and the small car seats 31 passengers with standing room for ten. The car received the blessing of the Ministry. We claim that a unit 75 ft. long, for carrying 150 passengers, does not block a street as much as two vehicles of 35 ft. With the modern higher maximum Board of Trade speeds of 20 m.p.h. rail saturation is becoming an important matter, and merely higher speeds do not help to solve the problem.

I have recently come back from America with the confirmed

view that we are on the right lines, except perhaps that we have too many stops. A modern tramcar should not stop more frequently than once in 300 yards. The public considers 20 m.p.h. a crawl, and a modern tramcar takes 150 yd. to get up to 25 m.p.h., and then very nearly an equal distance to come to rest again, without violent bumps.

The actual live weight of a car is 3½ tons, and a good day load-factor is 25 per cent., so that we have a live average paying weight of less than one ton, and for this we have been for years running about 16 tons dead weight of car. Not only has dead weight had to be carried, but, worse still, it has had to be accelerated and braked. Mass and time are the two chief constituents in the equation; friction takes but little part.

We have found that it takes 1½ to 2 minutes to unload the 90 passengers at one time; in this time the more mobile omnibus has emptied its spoonful and gone. We set about designing a new car which had to be fast and accelerate quickly, to have bogie trucks, be lightweight, especially in regard to its unsprung weight, and quiet; the passengers were to be able to circulate, and the car had to have a vestibule and one straight floor-line all the way through. It had to be built so that it could be a coupled car if needed, and have good ventilation, seat at least 70 passengers, be pleasantly decorated, and have good lighting. We have built a car to this specification. The "Bluebell"* has given general satisfaction to the public, and is now in daily operation on the Golder's Green route.

At the same time instructions were given the London General Omnibus Company to build a tramcar, bringing their vast omnibus construction experience to bear, with the result that they have built a tramcar which is called "Poppy."* This car is certainly novel in its design and construction; special care has been taken with a view to comfort, both in the lower saloon and on the top deck. The exterior of the car looks like an omnibus; in fact, the idea was to give the 'bus people a free hand to build what they thought an omnibus on a rail should be, within the tramway regulations; in fact, a tram-'bus. They have compromised with a combination of cross-seats and longitudinal seats in the parlour, but have made a splash on the top deck. It is also noticeable that they have shut the motorman in a cab by himself and done away with the old-fashioned bulkhead.

A model of a centre entrance and exit car has been built with the doors under control; the large doors worked "in" and "out"; the driver's platform only of such a size to allow room for operation; and with one large platform in the centre of the car so that passengers can pay their fares as they pass the conductor. Other cars have been built on the older-fashioned lines for seating 74. These are of all-wood construction, but fitted with cross-seats of de luxe pattern; they each weigh over 16 tons. These new designs will be carefully considered, their merits and demerits carefully watched in service, particularly to see if the new and lightweight design will stand up to the rackings, and whether circulation is popular and really saves time; also whether the combined air and track brake is good enough to maintain a high average speed of 10 m.p.h. through London traffic.

It is difficult to say whether the Restrictions Order, the fast motors or the de luxe seating has brought the traffic back, but to-day, where fares and headways are equal, there is no public preference for the omnibus, as will be seen from the curve of passengers carried at Ealing, fig. 1. The acute peaks are, of course, workmen's traffic at workmen's fares.

On the M.E.T. we are fitting 45 cars with high-speed motors, and instead of a master control we are using ordinary controllers, but with a device called the line switch, imported from U.S.A., which makes and breaks the current and at the same time does away with the automatic circuit breaker, with all its drawbacks. The cars will run alternatively with the older stock, which have been fitted with a device for giving the motors a 25 per cent. shunting. The device is automatic, and cuts out on abnormal current, so that it gets away from the old evils of motormen's abuse and at the same time increases the acceleration and high-speed running. Figs. 2 and 3 show the results of tests that have been taken with the various types of motors.

Everything to-day must be subordinated to speed, not a high maximum, but a high average, and this means power. The American motor-car to-day is so popular because it accelerates quickly. Speed means power. The modern tramcar takes 250 amperes starting current; the feeder capacity needs increasing and the rail gets overloaded, so that speeding-up has its trials, and is not merely a question of placing an order. High speed also brings in its train trolley troubles. There is a limit to the speed of a trolley wheel, and a couple of cars are being fitted with bow collectors of different makes. Bridges have been one of the troubles with open-deck cars, as passengers could reach the live trolley when centralised for the bow, but a device has been designed whereby the double trolley wire is run under the bridge in the centre for the bow collector, which is only alive as the bow collector car passes under the bridge. The other important question of speed is, of course, braking. There is no doubt that the magnetic brake is the best, but this brings wear of rail, &c., and, if badly handled, undue stresses on the car bodies, and discomfort to the passengers. Experiments have been made on a car fitted with a device whereby the magnetic brake is worked from the motors in the usual way, but with the fields energised from the trolley, the control being on the field and not on the main current. This does not save rail wear, but makes a smooth stop and stops all rack of the cars and discomfort to passengers, and cuts down the heavy voltage on the motors; an emergency change-over switch serves in the event of the line-current failing.

The average speed of a journey through town in a petrol vehicle on a skiddy day is cut down because the driver knows that if he hurries he has not that reserve brake power behind him. With a tramcar fitted with magnetics the motorman, on the other hand, feels just the reverse; he knows from

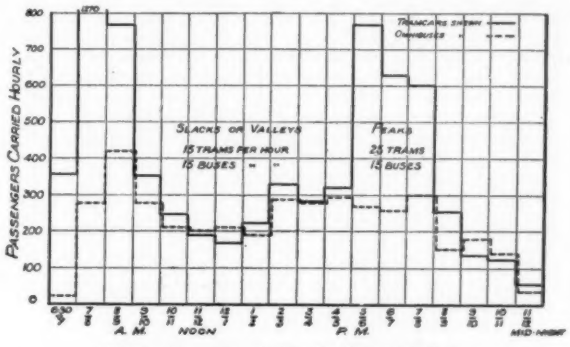

Fig. 1.—Tramcar and 'Bus Loadings at Ealing.

experience that the brake will pull him up promptly, irrespective of the state of the rail, and that if he skids the wheels are released automatically. One is chary, therefore, to get away from the principles of the magnetic shoe. One thought in America was to add the magnetic feature for emergencies, but energised from the trolley wire. I think this may be the solution, as one should get away from this constant working of the motor. I leave the door wide open here for the designers, users or manufacturers of the combined air and regenerative magnetic or electric brakes now in use in several towns. A very interesting proposition is a safety car with the control tied up with the air brake, air doors and electric line-switch. Our one-man cars contain most of the same safety features and operate well, but they are not popular.

We have made experiments with several of the types of 4-wheel trucks with flexible axle boxes and, in fact, have made some "jazzers" by the adoption of the Warner flexible axle-box, but I have had no inside or personal experience of

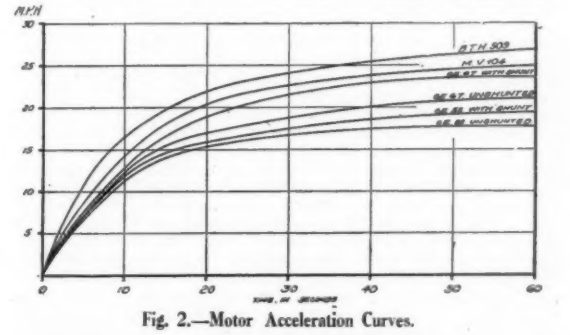

Fig. 2.—Motor Acceleration Curves.

the double single-axle truck, such as they in the North Country are adopting. Tales have floated south of 37½ m.p.h. and the old engine wine-glass test. The questions arise in my mind, why perpetuate an evil? and why not go whole-heartedly for a truck with good riding properties? Grades and adhesion can be cured by bogies, 4-wheel bogies and four small motors of maximum traction if the grade causes wheel slip.

I did not see a great deal of special interest in America. They are chasing the same hare as we are; they have Traffic Acts in all the towns of importance, but they will not keep their franchises clean if they do not live up to the public's requirements. They also preach comfort and speed, and I was struck by the number of cities adopting four-motor equipments, 25 h.p. each for light cars and 35 h.p. for heavy cars. At one time we were considering four-motor equipments, and found that the complete equipment of four 25-h.p. motors cost £800, whilst two of 50 h.p. cost £600, and as we have no grades steeper than 5 per cent. we believe that the two-motor decision is a wise one.

More or less recently Mr. Spencer and I visited Paris and saw their tram-'bus; we were very much struck with the lack of rattle and the smoothness of the running of the vehicle. Gear noises were not eliminated by any means by the adoption of a bevel gear and cardan shaft, and we came away with

* These tramcars were described in the ELECTRICAL REVIEW, March 11th, 1927, p. 381.

the idea that there was more weight with the bevel gear and its housings than the ordinary spur-gear car with the motor on the axle. The weight of the outfit also was heavy—11¼ tons, approximately, to carry 30 passengers seated. The motors were slow speed, for the cardan shaft and bevel gear only gave a gear ratio of 6 to 1, but the absence of rattle was due to braking on a drum, and the self-contained sub-truck, and with the long wheel-base the riding was excellent, but it was a single-deck unit. Berlin, on the other hand, is working on somewhat similar lines, with a cardan shaft, but they have two reductions, a bevel and a worm, and so get 10 to 1, which is really the only reason for the adoption

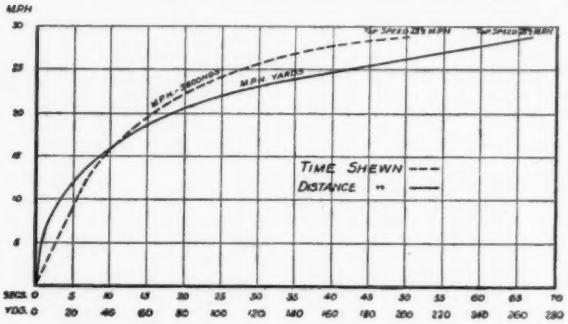

Fig. 3.—Time and Distance Test Curves.

of a cardan shaft drive. So far I have failed to see the type of drive suitable for a bogie truck, without having to adopt a universal joint, not only to take up vertical play, but the swing of the trucks as well; by the adoption of four small 25-h.p. motors there is room on the axle to put the "drums" to brake on, as at Grand Rapids, where, when the air is applied, they get good service stops, though not the "brick-wall" emergency stop wanted in London.

I found the Americans very busy putting their houses in order from the point of view of straight economics. Wages were up 120 per cent. on pre-war rates, and fares 50 per cent. I was interested in their shop methods. Shop overhaul takes place every two years and depôt maintenance is run on a strict mileage basis.

I was very struck with the all-aluminium car at the Convention at Cleveland. I rather looked upon it as a freak, but I see in the *Electric Railway Journal* that it is successful and has stood up to the work.

Discussion.

Mr. R. S. PILCHER, in opening the discussion, congratulated the Metropolitan Electric Tramways Co. upon its courage in making the changes in car design outlined in the paper. He agreed that the double-bogie truck made for extremely smooth running, but said that should not condemn the single-bogie truck; he had some of the latter with a long wheel base which entirely eliminated jazzing and rocking. The welding of flanges on the wheels was tried in Edinburgh during the coal strike with success, mechanically, but it was not found an economic proposition. In a light-weight tram-car design it had been possible to get the weight down to 371 lb. per seat, a little less than the "Bluebell" car. This light type of car had been running for seven years without the slightest sign of movement; in view of this it was extraordinary to find that some tramway experts were inclined to use heavier cars. The pinions which had been running on this light type of tramcar for seven years showed no signs of wear at all; the fact that they were running in oil might account for this. In Edinburgh an armature repair shop had never yet been used; perhaps the reason was that they had h.p. in reserve in the motors, and not motors only just large enough for the job. Air brakes were used on the wheels, and the electric brake was used in emergency.

Mr. N. CLOUGH suggested that the fixed trolley head of the central under-running type should be tried out in this country. He had used this system in America with wheels up to 9 in. in diameter; a little collector surface inside prevented the wheel from being fused away extensively.

Mr. R. H. CAMPION asked for details of the working of the new S.D. bogie truck at Bradford, and also for more information concerning the use of ball and roller bearings. The latter would have to be considered more than they were at present. He hoped that more would be heard about the bow trolley.

Mr. R. HUMPHRIES said that the smaller undertakings required some form of standardised rolling stock, so that although they could only afford to order one or two cars at a time, they could be certain of getting the same type of car again. There was no need for any engineer to go out of this country for all his needs in tramcar electrical equipment; he wished he could say the same word of praise for our truck and body builders. There seemed to be something approaching finality in the cars that had been described in the paper. It was six or 10 years ago that he started building the non-bulkhead car of the single-bogie type, and he had never regretted it.

Col. Sir J. NALL, D.S.O., suggested that the time had come to make the top saloon as comfortable as the lower saloon. The general practice was to make the seating inferior and to have the seats differently arranged. The elimination of the common bulkhead and the glazing-in of the end platforms produced a much more attractive looking vehicle. There still seemed some indecision as to where to put the staircase. Why should not the driver be on the upper deck? In the N.S. type of 'bus the driver was much higher up than in the older forms of 'buses, and it was a great advantage to him. The higher position would give him a better look-out all round. On the electrified Lancashire and Yorkshire Railway they had tried the back entrance and front exit, but it was not satisfactory.

Mr. W. G. VERDON SMITH, referring to the mention of an American tramway undertaking having spent one million dollars on the renewal of its tramcars, asked what conditions this undertaking worked under. Was the franchise a limited one as was the case with tramway companies here? He doubted it because it was that fact which prevented tramway companies doing what they otherwise would do in this respect.

Mr. W. F. ENDEAN said that a few years ago his company decided to adopt a 48-seater single-deck car fitted with maximum-traction trucks, open at each end and fitted with air brakes, and very well lighted, and he regarded that car as the finest in the north of England.

Mr. W. CHAMBERLAIN said he would be a party to the standardisation of the bogie truck if it were possible to standardise towns. In Leeds recently a car to carry 72 passengers had been designed, and it was necessary to make a compromise and use the pivoted truck with a 10-ft. wheel base. The performance of the car was quite satisfactory, and the consumption was 1.8 units per car-mile, as against the 2¼ units mentioned by Mr. Mason.

Mr. R. B. HOLT pointed out that in many cases the use of the magnetic brake was economically impossible, owing to the effect on the rails. It seemed that brakes were getting too efficient. It was all a matter of the dissipation of the heat, and pressure did not have so much to do with it as we had been taught in the text books. The Westinghouse Pennsylvania tests carried out in 1913 contained a mine of information on this question, and it seemed to be a question of varying the area. A point for consideration was the possibility of uneven contact so that one portion of the shoe was heated up before the other, and warping took place. He believed it was possible to improve the efficiency of brakes without altering the period of retardation.

Mr. W. JOHNSTONE (Brush Electrical Engineering Co.) was pleased to see that his advocacy of greater co-operation between tramway managers and manufacturers was bearing fruit, but it had not gone anything like far enough. He did not think the criticisms that had been made of the manufacturers were quite justified; at the works of the manufacturers to-day were to be seen extraordinary examples of car-body construction. Regarding the prevention of oscillation, Glasgow Corporation was carrying out some exhaustive tests on all kinds of constructions, and the results were being published.

Mr. HUMPHRIES said his point about standardisation was that many of the smaller towns did not know what they wanted until they saw it. The manufacturers must be looked upon as the clearing house of ideas, and therefore it should be possible for them to have certain cars on the stocks from which at any rate the managers of smaller undertakings could select.

Mr. A. W. A. CHIVERS said that the decision recently to electrify the Mumbles Railway was due to the fact that there was a 999-years' franchise in respect of it. He agreed that great difficulties were placed in the way of tramway companies which had only short periods to run because of the speculation as to whether the necessary new capital for reconstruction would be forthcoming.

Mr. A. H. WALTON said that it was not possible for the manufacturers to spend a lot of money on pioneer standardising work in view of the competition of the motor-'bus. Regarding roller bearings, the trouble had been that the bearing manufacturers would give no guarantee whatever, and the car makers had to take it all. Roller bearings had not always given the best results, although the position was different now. It was this reluctance on the part of the roller-bearing manufacturers to take any responsibility, and the fact that the car manufacturers had to assume it all, which accounted in some measure for the high cost which had been complained of.

Annual Report.

The thirtieth annual general meeting of the Association was held in the Concert Hall, Pump Rooms, on July 1st, when the Council's report and the accounts for the year ended December 31st, 1926, were received. Members of the Council in place of those retiring by rotation were elected, and auditors were appointed. The revenue for the year amounted to £861, and the expenditure to £835. The total surplus on December 31st, 1926, was £837, of which £761 was invested in War Loans. The Council unanimously recommended the following members for election: Colonel Sir Joseph Nall, D.S.O., M.P., Messrs. E. H. Edwardes, L. E. Harvey, T. G. Richardson, E. R. Soames, and T. E. Thomas.

New Electrical Devices, Fittings and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.

An Improved Mining Motor.

A recent development in mining electrical equipment is the "Emcol" flame-proof motor, fig. 1, which has been introduced by MESSRS. WALTER MCGEE & SON, LTD., Albion Works, Paisley. The cooling features of this machine are such, it is claimed, that the motor is no larger than the open-protected type of similar rating. A departure from the usual practice is the square casing. The switch, for either star-delta or direct starting, can be mounted on any of the sides. The casing is made of cast-iron, with suitable flanges to take robust end covers. It is bored to take the stampings, and the whole core is assembled and keyed under hydraulic pressure. One set of ducts provides for the circulation of the hot air,

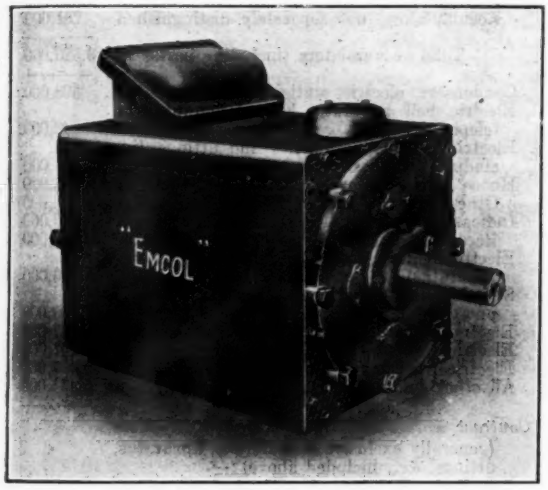

Fig. 1.—Mining-Type Motor.

and another carries the air which is circulated by means of an external fan, the heat generated in the motor being dissipated through the metal between the ducts. The shaft is designed to stand up to the most arduous duty. The bearings are of the ball and roller type, the latter being fitted at the driving end. A vent is fitted on the casing to relieve any pressure from internal gas and to extinguish the flame in the event of internal explosion. The motor can only be dismantled by special spanners, thus making the machine more or less foolproof. Arrangements are made to allow the motor to be accommodated in any position through 90 deg.

A New Electric Fire.

A recent addition to the range of "Inventum" appliances marketed by Mr. ALAN WRIGHT, 124, Chancery Lane, London, W.C.2, is the "New Guinea" one-bar electric fire, fig. 2. This embodies the Inventum plug-in element and standard

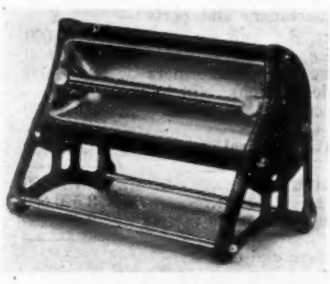

Fig. 2.—A One-Bar Fire.

parabolic reflector. It is claimed that the area heated is considerably greater than in the case of the bowl fire. The general construction is rigid and strong, while the fire is quite portable. It is finished in "brown crystallised." The reflector can be easily replaced. It can be supplied with fire bars of either 500- or 700-W loading.

The "Typerlite."

This lighting appliance, fig. 3, has been designed to meet the demand for an economical lighting unit for giving an even distribution of illumination over the typewriter; although, of course, it can be put to other uses. It is constructed in three pieces, a base with two hinged folding side arms, which expand, enabling them to be fitted round any size of typewriter, a

Fig. 3.—Typewriter Lighting Unit.

square upright tube which fits into the base, and the top, a square brass nozzle which fits over the end of the upright and carries a length of metallic flexible tube with a knuckle joint, a switch lampholder, and a shade carrier. It is supplied complete with a green parchment shade, 6 ft. of flexible cord and an adaptor, and is marketed by MESSRS. ELECTRICITY SERVICES, LTD., 27, Martin Lane, London, E.C.4.

A Novel Electric Lamp.

A new lamp which enables research workers to examine objects which were previously considered invisible, even with the aid of a microscope, is a recent development of the WESTINGHOUSE LAMP COMPANY, Brooklyn, N.Y., U.S.A. It is designed to overcome the difficulty of obtaining a true light on all sides of the object to be examined. The only light ordinarily available "flattens" out the perspective of the object as a result of the intensity of the light from one direction and the lack of it from another. The new lamp is shaped like a horseshoe and the glass part consists of a fine curved tube, silvered internally, except on a narrow strip running the length of the tube through which the light emerges. The silvering serves as a reflector to throw all the light rays out through the clear part. The exterior is painted black, except for the unsilvered portion, so as to prevent any light escaping, except through the clear glass, which is on the inside circumference of the "horseshoe." It is necessary to confine the light rays in this manner, as otherwise they might be thrown back into the eye of the observer, through the microscope, and make it impossible for him to see anything at all. The filament runs the length of the tube and is mounted on tiny supports like miniature hair pins. The air is exhausted from the lamp after the filament is in position and the ends of the tube sealed. The lamp is operated at 9 V, and its loading is 0.7 A. It is claimed that the device will stand up to hard usage and burn as long as the ordinary incandescent lamp. When in use it is laid on the glass plate of the microscope around the object to be examined. The glass of the plate allows light from below to filter through so that the specimen is lighted from every side, preventing distortion and shadows.

Electrical Production in 1924.

Preliminary Census Report.

CONTINUING the series of preliminary reports on the 1924 Census of Production, the *Board of Trade Journal* for June 30th contained an admirable summary of the work of the engineering trades. For the purpose of the census the engineering industry was divided into three groups, *viz.*, the motor and cycle trades, electrical engineering, and general engineering. The *Journal* deals with five groups—electrical machinery and apparatus, marine engines, other prime movers (including boilers), textile machinery, and machine tools. It is explained that there is overlapping between the groups, but the separate aggregates given for each group cover the bulk of the output of that group as shown in the aggregates for the trade as a whole. In the general engineering group several items appear which must be partly electrical, or at least allied to the electrical industry. Such are conveying and lifting machinery, boilers, condensers, mining plant, &c. The total selling value of work done in the general engineering group during 1924 is given as £153,821,000; the figure for the electrical engineering trades is £69,938,000, giving a grand total of £223,759,000. The equivalent figures for 1907 were: General engineering, £88,191,000; electrical engineering, £13,889,000; total, £102,080,000. Thus, making allowance for the inclusion of marine machinery in the 1924 figures, the value of electrical engineering production in 1907 formed about 14 per cent. of the total, while in 1924 the proportion was over 33 per cent.

Although there may have to be some final adjustments, these will be so small as to hardly affect the figures now available. In the case of electrical machinery the census schedule required a statement of the tonnage made, but owing to the inability of many manufacturers to provide these figures the requirement was generally waived, and therefore no quantitative measurement of production is available.

Table 1 shows in detail the value of electrical production in 1924:—

Table I.—Values of Electrical Goods produced in 1924.

Products.	Selling value. £
Electrical machinery and parts:—	
Generators:	
Alternating current	1,026,000
Direct current	679,000
Alternating and direct current, not separately distinguished	397,000
Total generators	2,102,000
Railway and tramway motors	1,537,000
Other motors:	
Alternating current	2,150,000
Direct current	1,658,000
Railway and tramway and other motors, not separately distinguished	245,000
Total motors	5,590,000
Convertors and transformers, including coils:	
Rotary	933,000
Static	1,840,000
Rotary and static, not separately distinguished	67,000
Total convertors and transformers	2,840,000
Control and switchgear	3,538,000
Magnetos, ignition	600,000
Other electrical machinery	762,000
Total electrical machinery and parts	15,432,000
Electrical goods and apparatus:—	
Carbons, electric (including furnace electrodes)	565,000
Electric incandescent lamps—	
Gasfilled	1,037,000
Other	1,379,000
Other electric lamps and parts (except carbon rods and primary batteries)	16,000
Total electric lamps and parts	2,432,000
Telegraph apparatus	223,000
Telephone apparatus	3,649,000
Wireless apparatus (except valves)	4,845,000
Thermionic valves	1,262,000
Electric wires and cables, insulated:	
Rubber insulated (not being telegraph or telephone wires and cables)	3,596,000
Insulation other than rubber (not being telegraph or telephone wires and cables)	8,471,000
Telegraph and telephone wires and cables (not being submarine cables)	3,685,000
Submarine telegraph and telephone cables	2,692,000
Total electric wires and cables, insulated	18,444,000
Batteries, primary	768,000
Accumulators (including parts):	
Portable, for vehicles	353,000
Portable, other	1,566,000
Stationary	1,320,000
Accumulators, not separately distinguished	281,000
Total accumulators (including parts)	3,520,000
Condensers, electric, static, power	393,000
Electric bell apparatus (not telegraphic or telephonic)	42,000
Electric lighting accessories and fittings (including switches)	1,561,000
House service meters	978,000
Other meters	86,000
Indicating instruments	430,000
Recording and other measuring instruments	152,000
Electro-medical apparatus (including X-ray apparatus)	66,000
Switchboards (other than telegraph and telephone)	1,659,000
Electrical heating apparatus	287,000
Electrical cooking apparatus	141,000
Electrical goods and apparatus, n.e.s.	2,437,000
All other products	5,451,000
Contract work (electrical) in United Kingdom (generally exclusive of materials, apparatus, fittings, &c., included above):—	
Installation of telegraph and telephone apparatus, test boards, &c. (including wireless telegraphy and telephony and telephone switchboards)	265,000*
Telegraph and telephone lines and cables	270,000*
Electric power or lighting lines or works	2,615,000*
Total contract work (electrical)	3,150,000*
Repair or maintenance work for customers	1,965,000*
Total value of goods made and work done	£69,938,000

* Value of work done.

The next table (No. II) illustrates the expansion of production since 1907. The figures for that year include an item of £8,000 representing goods made and work done in Ireland.

Table II.—A Comparison of 1924 with 1907.

Products.	1924. Selling value. £	1907. Selling value. £
Electrical machinery and parts:—		
Generators, d.c. and a.c.	2,102,000	815,000
Motors, d.c. and a.c.	5,590,000	1,729,000
Convertors and transformers	2,840,000	421,000
Other descriptions (including switchboards)	6,559,000	1,249,000
Total—electrical machinery	17,091,000	4,214,000
Primary batteries	768,000	109,000
Accumulators	3,520,000	440,000
Electric lamps and parts thereof	2,432,000	465,000
Insulated wires and cables:—		
Rubber insulated (except telegraph or telephone)	3,596,000	1,300,000
Insulation other than rubber (except telegraph or telephone)	8,471,000	2,051,000
Telegraph and telephone (except submarine)	3,685,000	809,000
Submarine	2,692,000	1,102,000
Total—electric wires and cables	18,444,000	5,262,000

Products.	1924. Selling value. £	1907. Selling value. £
Wireless apparatus (except valves)	4,845,000	—
Other electrical apparatus and accessories	12,272,000	1,748,000
Contract work in United Kingdom	3,150,000	1,322,000
Repair and maintenance work for customers	1,965,000	337,000
Total value	£64,487,000	£13,897,000

The main value of the products of the electrical engineering industry in the year 1924, measured by value only, was about 4.6 times that of the year 1907—an increase which represents a very substantial advance in volume of production, even when price changes are taken into account. The increase affected all parts of the trade in a greater or less degree, being most marked in the case of "Other electrical apparatus and accessories," for which the large amount shown is due largely to the development which has taken place in the use of the telephone. The introduction since 1907 of wireless telephony has made a further large contribution to the total value of the output. The increased production of motor vehicles is a cause to which the advance in the output of accumulators may be partially due, and the greatly extended use of electricity in the application of power in industry generally is reflected in the expansion which has taken place in the production of electrical machinery. It will be observed that the most important classes in respect of which the increase in values is lower than that shown for the trade as a whole are submarine cables, in which the figure shown for 1924 exceeds that for 1907 by about 144 per cent., and contract work, in which the advance in 1924 is about 138 per cent.

Table III shows the values of the most important classes of electrical machinery and apparatus exported and imported in 1924, compared with the production.

Table III.—Production, Exports and Imports in 1924.

Kind of goods.	Production. Value.	Exports. Value.	Net Imports Value.
Electrical machinery:—	£	£	£
Generators	2,102,000	1,253,000	83,000
Motors	5,590,000	1,647,000	201,000
Convertors and transformers, including coils	2,840,000	699,000	87,000
Control and switchgear...	3,538,000	945,000	25,000
Magnetos, ignition ...	600,000	28,000	17,000
Other machinery (including switchboards) ...	2,421,000	872,000	571,000
Total—Electrical machinery	17,091,000	5,444,000	984,000
Electrical goods and apparatus—			
Insulated wires and cables:			
Rubber insulated (not telegraph or telephone)	3,596,000	1,323,000	212,000
Insulation other than rubber (not telegraph or telephone)	8,471,000	1,184,000	240,000
Telegraph and telephone wires and cables (not submarine	3,685,000	1,022,000	118,000
Submarine telegraph and telephone cables	2,692,000	948,000	—
Total—Electric wires and cables, insulated ...	18,444,000	4,477,000	570,000
Telegraph and telephone apparatus (except wireless valves)	8,717,000	2,659,000	817,000
Electric lamps and parts	2,432,000	352,000	219,000
Carbons	565,000	27,000	117,000
Batteries, primary ...	768,000	125,000	317,000
Accumulators and parts	3,520,000	617,000	57,000
Electric lighting accessories and fittings (including switches) ...	1,561,000	603,000	234,000
House service meters ...	978,000	198,000	101,000

The net output, *i.e.*, the difference between the total value and the cost of materials used and work given out to other firms amounted to £33,393,000. The net output per person employed was £213, comparing favourably with the figure for the whole engineering industry (£199), notwithstanding the larger proportion of females employed. The average number of persons employed was 156,508, of which 33,381 were in administrative positions. The number of female operatives employed was a little over one-quarter of all operatives. The industry had 29,916 kW of generating plant and 158,170 h.p. of electric motors (power for 111,469 h.p. of which was purchased).

Shipley's Electricity Supply.

The Inauguration of a Bulk Supply in Lieu of Generation.

THE ceremonial inauguration of a supply of electricity in bulk from the Yorkshire Electric Power Co.'s system to that of the Shipley Urban District Council was performed on June 30th by Sir Andrew Duncan, M.A., LL.B., chairman of the Central Electricity Board. The event, being the first of its kind to take place since the appointment of the Board, is of special interest in that it is an example of the fulfilment of one of the declared objects of the Board's national policy, namely, the closing down of the smaller generating plant and the concentration of the production of electricity in large efficient stations.

Whilst the worsted industry is still Shipley's staple trade, new industries are growing apace, upon which developments the availability of electric power will have an important influence. Started 26 years ago, the local electricity station was amongst the first to employ Parsons steam turbo-generators, and the average annual increase of the sale of energy by the undertaking has exceeded 200,000 kWh, reaching a total this year not far short of 4.5 million kWh. The march of progress, however, induced the Urban District Council's electrical engineer, Mr. William Redman, A.M.I.E.E., to countenance the supersession of his local generating plant by a supply of electricity in bulk, which is derived from the extensive system of the Yorkshire Electric Power Company, whose principal generating stations are at Ferrybridge, on the river Aire, and at Thornhill, on the river Calder: the former will have an ultimate capacity of 180,000 kilowatts,

Left to right: Mr. A. G. Lupton, director, Y.E.P. Co.; Mr. A. Page, chief engineer, C.E. Board; Mr. F. F. Rhodes, chairman, Shipley Electricity Committee; Sir A. Duncan, chairman, C.E. Board; Counc. V. Waddilove, chairman, Shipley U.D.C.; Mr. W. Redman, electrical engineer, Shipley U.D.C.; and Mr. W. B. Woodhouse, engineer and manager, Y.E.P. Co.

Inaugurators of the Shipley Bulk Supply.

and the latter is now being extended to a capacity of 60,000 kilowatts. The two stations, which are interconnected, have been established on sites selected with regard to the position of the coalfield and to the availability of an ample supply of water for condensing purposes, whilst at the company's third station, near Barnsley, power is largely derived from surplus coke-oven gas.*

The supply for Shipley passes through the company's 33,000-volt sub-station at Rodley, whence it is transmitted to Shipley by duplicate cables having a total carrying capacity of 30,000 kilowatts; at the Shipley sub-station the energy is transformed down to 6,300 volts for the Shipley supply, and to 11,000 volts for interconnection with the company's local high-pressure distribution system. The necessary transformers and switchgear have been accommodated in a building formerly used as a battery room. The 33,000-volt switchgear comprises five units, two for controlling the incoming feeders from the Rodley sub-station, one for the Silsden feeder, and two for the main transformers; each main switch has a rupturing capacity of 500,000 kilovolt-amperes. Three 6,300-volt switch equipments are installed, two for the main transformers and one for the control of the transformer interconnecting the company's 11,000-volt system: these switches have a rupturing capacity of 100,000 kilovolt-amperes each.

The quantity of electricity supplied to the Council is registered by metering equipment connected to the existing switchgear in the engine room, one set of meters being the property of the Council and the other of the company. Two three-phase oil-immersed self-cooled transformers, each of 4,000 kilovolt-amperes capacity, are installed in chambers on the same level as the main switchgear, and in addition to the main transformers, two 700-kilovolt-ampere three-phase units are provided for interconnection with the company's 11,000-volt system. Similar apparatus is installed at the Shipley sub-station.

* ELECTRICAL REVIEW, July 17th, 1925.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Royal Assent.

The Royal Assent, by Commission, has been given to the following Acts:—Pacific Cable Act, Fareham Gas and Electricity Act, North Metropolitan Electric Power Supply Act, and Yorkshire Electric Power Act.

The Wessex Electricity Bill.

It is announced that this Bill, which is to incorporate the Wessex Electricity Company with a capital of £750,000, is to pass as an unopposed measure through the House of Commons. The company is asking for power to supply electricity in the counties of Oxford, Bucks, Berks, Southampton, Wilts, and Gloucester. The borrowing powers are limited to one-half of the issued capital.

Electricity Companies' Bills.

The County of London Electric Supply Company Bill and the East Anglian Electricity Bill have been read a second time in the House of Lords.

Hastings Tramways Bill.

The preamble of the Bill promoted by the Hastings and District Electric Tramways Co., Ltd., to empower it to substitute railless traction for tramcars, &c., was found proved last week by a Select Committee of the House of Commons.

Telephone Development.

On July 28th, Sir W. MITCHELL-THOMSON informed Lt.-Commander Kenworthy that the estimated expenditure on the development of the telephone system for the current financial year (1927-28) was about £12,000,000. The figures for 1926-27 and 1925-26 were £10,611,000 and £11,902,000, respectively. The expenditure in 1926-27 would have been greater but for the coal stoppage.

Private Wireless for Trawlers.

On June 28th, Mr. GROTRIAN asked the Postmaster-General whether, in view of the great advantage to the fishing fleet, it was permissible for private individuals to establish a wireless telephone service with the trawlers and other vessels with which they were connected.

Sir W. MITCHELL-THOMSON said that in view of the risk of interference it was not practicable to permit the establishment of private wireless stations for communication with ships at sea. Vessels fitted with wireless telegraph apparatus could send and receive messages through any of the Post Office coast stations; and in order to meet the needs of a number of trawlers which had recently been fitted with wireless telephone apparatus, arrangements were being made to equip the new coast station now in course of construction at Mablethorpe with suitable apparatus for the exchange of messages with those vessels by wireless telephony.

Post Office Tube Railway.

On June 22nd, Sir W. MITCHELL-THOMSON informed Mr. Glyn that it was expected that the Post Office Tube Railway would be opened for traffic within the next three months. The sum expended to date was £1,550,000; the sum provided under the Post Office (London) Railway Act, 1913, was £1,100,000.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Standardisation of Pressure.

The B.E.S.A. has now standardised the pressure of supply at 400 and 230 volts for a.c. systems and 230 and 460 volts for d.c. systems, and all manufacturers and consumers are eagerly looking forward to the day when all supplies are adjusted to these common standards.

Would it not be a great encouragement, to all concerned, to get busy on the necessary adjustments if the member firms of E.L.M.A. and B.E.A.M.A., together with other associations of manufacturers, would agree to reduce the price of all 230-V domestic equipment by a small amount over 200-, 210-volt, &c., gear, after a given date, say, January 1st, 1929?

The alternative would be to raise the price of non-standard equipment by a small amount, but that would not be so satisfactory to the public.

Immediately the differentiation in price between equipment and apparatus manufactured for standard and non-standard pressures becomes effective, public opinion will force the supply people to find a very good reason indeed for the retention of non-standard pressures, and clearly it is one of those cases in which the greater the delay, the more difficult the adjustment to standard pressure becomes.

Manufacturers, wholesalers, and retailers agree that the construction and sale of equipment for a dozen or more pressures is costly, but hundreds, if not thousands, of static transformers are being sold to-day for non-standard pressures, the only excuse being that it follows precedent in that particular district.

All extensions to new districts fed from a.c. supplies should be carried out at 230 volts, even although the existing pressures of 200, 210, &c., volts are retained in the older districts in the meantime.

It must be admitted that public opinion, educated and impelled by the reduction in cost of standard equipment, must be a far stronger force in bringing about this most desirable reform than a B.E.S.A. Specification.

Grierson, Ltd.
R. GRIERSON, *Managing Director.*

London, *July 1st*, 1927.

Fuses Operating on Short Circuit.

I was privileged to witness a series of tests on different types of fuses under short-circuit conditions (on direct pressure, 450 volts) by Messrs. Parmiter, Hope & Sugden at the St. James' and Pall Mall Regent Street Station on Tuesday, the 28th ultimo. The tests were reminiscent of those which I conducted under the direction of Mr. Sydney Baynes at the St. Pancras Pratt Street Station about the year 1911, by which means he demonstrated the dangerous aspect of inefficient fusegear—justifying his appeals to consumers to adopt a safe type, inasmuch as the protection of their installations otherwise devolved upon the supply service fuses.

It would appear that there is still some misconception in the minds of some—due to non-observance of Ohm's fundamental laws—as to what is likely to occur under a healthy short circuit with turbo-generators in full support and with metal covers of fuse gear "earthed" in common with the neutral. Comparatively little trouble was experienced in the days of the old reciprocating prime movers which conveniently pulled up slow under the heavy load.

One gentleman at the St. James' tests asked me: "Who would think of putting 6,000 amperes on a 60-ampere fuse?" My reply was: "Not deliberately, but it is possible to get heavy currents under short-circuit conditions."

If I recollect aright, in the tests I conducted at St. Pancras we had an ammeter, voltmeter, and trip circuit breaker in circuit on 440 volts.

	Short-circuit current.
On 3-in. clear open break in air, 2 strands 5 amp. lead	1,200 amps.
On 4-in. clear open break in air, 10 strands 5 amp. lead	1,000 amps.
On 4-in. clear open break in air, 8 strands 5 amp. lead	900 amps.

The tests were conducted under practical conditions, there being 3,460 yards of cable intervening, namely, 1,730 of 1-sq. in. feeder, 330 of 0.2-sq. in feeder, 1,000 of 0.25-sq. in feeder, and 400 of 0.5-sq. in feeder, excluding lengthy connecting cables. One 1,000-kW turbo-generator and two 1,000-kW Peebles motor convertors were backed by 2,500-kW, 3-phase alternators.

As far as I recollect, only one or two types of fuses gave little evidence of operating—one being the familiar small enclosed earthenware cartridge, the other a lengthy fibre cylinder with metal end knife connectors.

J. C. Elvy.

London, *July 4th*, 1927.

The British Industries Fair.

With reference to your recent comments as to the date of the British Industries Fair, I am writing to inform you that the matter was the subject of a full discussion at a meeting of the Electrical Section Sub-Committee held in Birmingham yesterday.

With regard to the 1928 Fair, arrangements have already been made (which cannot be altered), for the Fair to be held from February 20th to March 2nd.

As to the future, it is obvious that apart from any other considerations, the most appropriate date for the Fair is that period of the year when buyers are in this country in the greatest numbers. This being so, the manufacturers throughout the country, whether exhibitors or not, are the people who are in the best position to judge.

The Sub-Committee charged with the arrangements for the Electrical Section of the Fair therefore decided, first, to ascertain by questionnaire at the appropriate time the opinion of the exhibitors at next year's Fair, and, secondly, the opinion of the general trade interests, whether exhibiting or not, through their appropriate trade organisations.

I am pleased to be able to add that the bookings of space for the Electrical Section of the 1928 Fair to date are entirely satisfactory.

E. J. Jennings,
Hon. Sec., Electrical Section,
British Industries Fair.

Birmingham, *July 1st*, 1927.

Cheaper Wiring.

With reference to Mr. A. Milne's letter of June 16th last, as chairman of the Glasgow Section of the Electrical Contractors' Association of Scotland I should be glad if Mr. Milne would get in touch with the local secretary (Mr. Peter Armour, 55, Bath Street) of that body, who would furnish him with particulars of all the steps which the Electrical Contractors' Association of Scotland has taken to combat this cheap wiring now so much in favour with some of our municipalities. The Electrical Contractors' Association of Scotland has been trying to get all electrical contractors to join the Association, as it recognises that unless the trade is a solid and united body, it is difficult to fight the present system. Let Mr. Milne join the ranks of the contractors who wish to raise the trade to a higher level, and so help on the good work.

Alex. S. Nairn.

Glasgow, *July 1st*, 1927.

I have read the letter from "A.H.A." in your last issue, and am astounded to think that such an enlightened electrical man can live under the conditions he mentions. Is this the old tale of the shoemaker?

Does he live all alone? or if he has a family, how does he control it? Possibly he locks up the apparatus in his wine cellar and brings out one thing at a time.

Would not the little extra cost of having a circuit in each room, with the possibility of using a fire of adequate size to heat the room, be worth while?

My firm is continuously engaged during six months of the year in reconstructing such installations as he mentions. We frequently lose heating jobs on account of the consumer accepting a "much lower estimate," and usually in spite of losing the job, obtain the order for the apparatus. We often find then that only one or two fires can be used at one time, and that no fire larger than 2 kW can be connected, much to the astonishment of the consumer.

Houses and flats are now frequently sold or let "Complete with electric heating in all rooms." The house agent conscientiously believes his description to be true when he has seen a plug in each room, and the purchaser or the tenant often finds, after entirely redecorating the premises, that only one or two fires can be used at one time. These troubles have the effect of annoying the consumer and impeding electrical progress.

In the recent "E.D.A.-E.L.M.A. Ballot" "Convenience" came first by a vast majority of votes, and that is what is expected most of electricity to-day.

Convenient, reliable, and safe service will always stand first in electrical progress, and it is up to installation and supply engineers to keep the cost of this service down to the lowest possible point, but not to sacrifice it to cheapness.

H. T. Young.
TROUGHTON & YOUNG, LTD.

London, *July 4th*, 1927.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1925.

31,550. "Ignition means for internal combustion engines." H. Walter and R. L. Broadwood. December 14th, 1925. (Cognate applications, 1,557/26 and 6,033/26.) (272,257.)

1926.

3,676. "Telephonic instruments." M. Graham, A. Graham (legal representatives of E. A. Graham (deceased)), and W. J. Rickets. February 9th, 1926. (272,269.)

6,025. "Electric terminals and the like." R. K. Spencer. March 3rd, 1926. (272,270.)

6,116. "Apparatus responsive to alternating electric currents." W. J. Brown and Metropolitan-Vickers Electrical Co., Ltd. March 4th, 1926. (272,271.)

6,254. "Working of submarine telegraph cables." W. Estaugh. March 5th, 1926. (272,273.)

6,572. "Control equipment for alternating-current power systems." British Thomson-Houston Co., Ltd., and F. H. Clough. March 9th, 1926. (272,289.)

6,727. "Lighting appliances." A. J. Stephens (W. A. Dorey). March 10th, 1926. (272,291.)

6,742. "Dynamo-electric machines." T. L. R. Cooper. March 11th, 1926. (272,292.)

6,840. "Coupling systems for radio valves." H. A. Gill (United Distributors, Ltd.). March 11th, 1926. (272,294.)

6,876. "Method of, and means for mounting the electrically-charged units of electrical distribution boxes." L. R. Lee. March 12th, 1926. (272,297.)

6,912. "Electromagnetic brakes and couplings for transmitting mechanical power." British Thomson-Houston Co., Ltd., and A. P. Young. March 12th, 1926. (272,299.)

6,913. "Variable-resistance devices." Standard Telephones and Cables, Ltd., and P. R. Painton. March 12th, 1926. (272,300.)

7,010. "Clip for electric cables." B. M. Drake and Drake & Gorham, Ltd. March 13th, 1926. (272,303.)

7,046. "Electric resistances." H. Wade (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). March 13th, 1926. (272,305.)

7,652. "Engine starters." Eclipse Machine Co. January 20th, 1926. (264,784.)

7,733. "Automatic or semi-automatic telephone systems." Coventry Automatic Telephones, Ltd., and B. F. Moss. March 20th, 1926. (272,310.)

9,741. "Electric converting apparatus." J. E. Calverley and W. E. Highfield. April 13th, 1926. (272,318.)

11,198. "Electric motor convertors." Brush Electrical Engineering Co., Ltd., and J. H. R. Nixon. April 28th, 1926. (Cognate application, 835/27.) (272,324.)

11,965. "Systems for use in connection with telephone lines." C. Lorenz Akt.-Ges. October 31st, 1925. (260,546.)

12,278. "Protective devices, particularly intended for thermionic-valve apparatus." British Thomson-Houston Co., Ltd. May 13th, 1925. (252,181.)

13,221. "Portable combined plug and socket for electrical purposes." B. A. Spaull. May 25th, 1926. (272,331.)

13,493. "Portable electric lamps." A. G. Westmoriand and S. Wiseman. May 28th, 1926. (272,333.)

13,657. "Electric telegraphy." W. G. R. Jacob and Eastern Telegraph Co., Ltd. May 29th, 1926. (272,335.)

14,086. "Thermally-operated electric switches." E. C. R. Marks (Williams Oil-O-Matic Heating Corporation). June 3rd, 1926. (272,336.)

15,154. "Drums for electric cables and the like." W. T. Henley's Telegraph Works Co., Ltd., and C. A. Walker. June 16th, 1926. (272,340.)

15,574. "Telephone or like systems." Siemens & Halske Akt.-Ges June 27th, 1925. (254,304.)

17,724. "Variable electric time switch." G. Cotterell. July 15th, 1926. (Addition to 250,091.) (272,351.)

18,433. "Ignition magneto-electric machines." Scintilla Akt-Ges. July 23rd, 1925. (255,895.)

20,263. "Polyphase induction-disk electric relay." J. C. McDonald. August 17th, 1926. (272,359.)

21,221. "Holders or sockets for thermionic valves or electron-discharge tubes." A. J. Stevens & Co. (1914), Ltd., and H. C. Willson. August 28th, 1926. (272,361.)

23,499. "Regulating transformers." A. Braun. September 23rd, 1925. (258,885.)

24,692. "Process and apparatus for recording sound." H. J. Kuchenmeister. October 13th, 1925. (259,946.)

25,051. "Electric furnaces." British Thomson-Houston Co., Ltd. October 10th, 1925. (259,599.)

26,076. "Electromagnetic devices." British Thomson-Houston Co., Ltd. October 19th, 1925. (260,004.)

29,471. "Thermionic valves and methods of manufacturing the same." A. Just. May 21st, 1926. (271,401.)

30,745. "Starting means for electric motors." Allmanna Svenska Elektriska Aktiebolaget. October 11th, 1926. (272,391.)

33,074. "Electric motor-control systems." V. Martinetto. January 28th, 1926. (265,160.)

1927.

237. "Methods of starting electric motors." Siemens-Schuckertwerke Ges. January 6th, 1926. (264,159.)

1,539. "Concentric cables for alternating currents." C. Vernier. January 18th, 1927. (272,407.)

2,758. "Electric motor-control systems." British Thomson-Houston Co., Ltd. January 30th, 1926. (265,236.)

3,902. "Electric motor controllers." R. H. Barbour and J. R. Walton. February 11th, 1927. (272,420.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from the dates mentioned. In the case of foreign applications, the names and addresses of the British representatives are also given :—

June 22nd.

Elstreflex. No. 470,242. Class 8. Radio-telegraphic and telephonic receiving and transmitting sets, thermionic valves, crystal detectors, electric transformers, condensers, and tuning coils.—Elstree Radio, Ltd., 2, Melbourne Place, Strand, W.C.2.

Ascegage. No. 480,446, Class 8, and No. 480,447, Class 11. Electric accumulators (not for medical purposes).—W. Haddon, 132, Salisbury Square, E.C.4.

Greenite. No. 480,547. Class 8. Insulated electric cables and conduits.—Greengate & Irwell Rubber Co., Ltd., Salford.

Neutrophase. No. 480,946. Class 8. Instruments and apparatus for use in radio-telegraphy and telephony.—Redfern's Rubber Works, Ltd., Dawson Street, Hyde, near Manchester.

B.I. (lettering and design). No. 478,928. All goods in Class 14.—British Insulated Cables, Ltd.

Kangaroo. No. 480,849. Class 18. Electric and gas fires and radiators.—Berry's Electric, Ltd.

Ellmar. No. 480,512. Class 50. Electric insulators and insulating substances consisting of phenol and formaldehyde condensation products.—Hollings and Guest, Ltd.

June 29th.

B.I. (lettering and design). No. 478,924. Class 1. Varnishes and soldering paste.—British Insulated Cables, Ltd.

Telefunken (lettering and design). No. 475,752. Class 8. Instruments and apparatus and parts thereof for use in the radio transmission of signals and pictures.—Die Telefunken Gesellschaft, Berlin. (Wm. Brooks & Son, 5, Chancery Lane, W.C.2.).

Omega (lettering and design). No. 478,935. Class 8. Instruments and apparatus for use in radio-telephony and telegraphy, but not including electric cables or goods of a like nature.—J. F. Rose, trading as Electrical Units, 104, North Street, Edgware Road, N.W.8.

Onyx. No. 479,319. All goods in Class 8.—Mullard Radio Valve Co., Ltd.

Pallophophone. No. 479,436. Class 8. Apparatus for the simultaneous reproduction of moving images and sounds.—British Thomson-Houston Co., Ltd.

Miraphonic. No. 479,715. Class 8. Radio-telephonic transmitting and receiving apparatus and parts thereof, &c.—Hermann Thorens, Sainte Croix, Switzerland (Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.).

Radium. No. 480,233. Class 8. Dry electric batteries (not for medical purposes).—Arthur Jones & Co., 8 and 20 Dock, Middlesbrough.

Sulfotron. No. 480,346. All goods in Class 8.—Lucien Levy, Paris. (John E. Raworth & Moss, 75, Victoria Street, S.W.1.).

Ebonart. No. 480,945. Class 8. Instruments and apparatus for use in radio-telegraphy and telephony.—Redfern's Rubber Works.

Pantophone. No. 481,022. All goods in Class 8.—Carl Lindstrom, Berlin. (Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.).

Valco. No. 478,674. Class 13. Electric lamps (ordinary).—Valco, Ltd., 13a, Tabor Grove, Wimbledon, S.W.19.

Usym. No. 480,113. Class 13. Incandescent electric lamps (ordinary).—James MacGregor, trading as J. MacGregor & Co., 11, Queen Victoria Street, E.C.4.

Glyphanite. No. 480,707. Class 50. Electric insulating material.—Micanite and Insulators, Ltd.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

BARNSLEY.—Mining college and technical institute, for the for the Borough E.C.; director of education.

BEXHILL.—Shops and flats, Marina; H. W. Binns.

BIGGLESWADE.—Additional 60 houses, for the R.D.C.; surveyor.

BLACKPOOL.—Hotel, North Shore; Sir Lindsay Parkinson and Co., Ltd., builders; R. B. Mather, Sons & Wilding, architects.

BOURNEMOUTH.—Works and offices, Orchard Street (£20,000), for D. Drake & Son.'

BRIGHTON.—Boys' secondary school (£68,900), for the borough E.C.; director of education.

BUCKINGHAM.—Memorial chapel, Stowe School (£40,000); John Parnell & Son, builders, Rugby.

CARSHALTON.—Housing scheme (over 800), for the L.C.C.

CHEAM (SURREY).—Hall, with electrical work, for St. Andrew's Presbyterian church; Matley, Brotherton and Mills, architects, Manchester; H. H. & F. Roll, builders, Epsom.

CHESTERFIELD.—Extensions, Nurses' home, for the B.G.; W. A. Derbyshire, architect.

COVENTRY.—Extensions, Earlsdon Working Men's Club and Institute; H. W. Chattaway, architect, Trinity Churchyard.

CROYDON.—Housing scheme (64), Upper Norwood, and shops and houses, South End, for the T.C.; borough engineer. Church hall for Wesleyan Trustees, London Road; H. Macintosh. Shops and billiard hall, corner High Street and Friends Road; North, Robins and Wilsdon, 39, Maddox Street, W.1. Joinery mills, 227, London Road; C. H. Gibson, Ltd., East Croydon. Water-softening plant, Borough Hospital; Patterson Engineering Co., Ltd.

DUNDEE.—Reconstruction of Corporation slaughter-houses; city architect.

EAST KILBRIDE.—Housing scheme (20), for Lanarkshire C.C.; P. C. Smith, District Offices, Hamilton.

EDINBURGH.—Cinema, High Street; P. S. L. Lucas. Nurses' Home and garage (£4,000); superintendent. George Square Nursing Home for Women.

GILESGATE MOOR (DURHAM).—Cinema, for G. Lamb and Son.

GLASGOW.—Church halls at Netherlee for Church Extension Committee of U.F. Presbytery; the clerk.

GUILDFORD.—Factory, Woodbridge; Dennis Bros., Ltd.

HADDINGTON.—Cottage hospital (£7,000); W. Burnet, solicitor, joint hon. secretary.

HAM (SURREY).—Houses (40), Fernhill Estate; E. J. Partridge, architect.

HEBDEN BRIDGE (YORKS.).—Post office and telephone exchange, Holme Street, for H.M. Office of Works, King Charles Street, London, S.W.

HIGH WYCOMBE.—Factory extensions, for Hughenden Chair & Furniture Works Co., Slater Street; W. Keen and Son, West End Road, T. Glenister, Hughenden Road, Mealing Bros., West End Road, and T. W. Mealing, Cromwell Road. Extensions, Technical Institute (£7,500), for Bucks. E.C.; county architect, Aylesbury.

HORLEY (SURREY).—Factory, Bonehurst Road, for C. Hodges & Co., Empire Works, Dalston.

HUDDERSFIELD.—'Bus garage, Bridgefield Depôt, Leeds Road; J. H. Field, town clerk, town hall. Re-erection of portion of works, Dalton, for the British Dyestuffs Corporation, Ltd. (several thousand pounds).

ILFRACOMBE.—Stores on property vacated by the Cornish Salvage Co.; Harbour Committee of the T.C.

IRISH FREE STATE (CLONMEL, Co. TIPPERARY).—Alterations Central Technical Institute, including electric lighting, etc.; R. J. Long, acting principal and secretary.

LEEDS.—112 houses on the York and Selby Road Housing Estate; town clerk's office, Great George Street.

LEICESTER.—28 houses, Braunstone Estate; F. Garner and Son. 98 houses, Braunstone Estate; Henry Boot and Sons, Ltd. 74 houses, Braunstone Estate; Browning Bros. 300 houses for Corporation at Braunstone Estate; Leicester and District Building Trades Employers' Association.

LIVERPOOL.—Re-building business premises, Houghton Street, for George Henry Lee & Co., Ltd., Basnett Street.

LLANELLY.—School, Queen Mary's Walk (£30,000); Education Committee.

LONDON (BECONTREE, E.).—15 shops and houses and commercial buildings, Green Lane and Wood Lane; C. Eaves.

(ILFORD, E.).—Factory, Becontree, for Achille Serre Co., Ltd., dyers and cleaners.

(WAPPING, E.).—96 tenements, Wapping Estate; L.C.C. and Canonbury Construction Co., Ltd.

(HENDON, N.W.).—Church, Watling Housing Estate; Wesleyan church authorities.

(ST. MARYLEBONE, N.W.).—Reconditioning block of property in Salisbury Place area; Marylebone Housing Association, Ltd. Buildings, Oxford Street, North Row, and Park Street; Boodle, Hatfield & Co. Building, Seymour Place, Harroby Street and Brown Street; Hoare and Wheeler.

(DEPTFORD, S.E.).—Remodelling waterworks (£211,000); Metropolitan Water Board.

(WOOLWICH, S.E.).—Extensive alterations, for Garrett and Co., Ltd., drapers, Kent House, Powis Street.

(WESTMINSTER, S.W.).—Congregational church, Orange Street; Kieffer, Fleming & Keesey, architects. Alterations, 3-5, Burlington Gardens; H. Kempton Dyson. Building site of 7-13, Vandon Street; Searle & Searle, Paternoster House, E.C.4. Renovating Surrey County Council offices at Eccleston Square; county engineer. Re-development, Park Street and Hereford Gardens; Grosvenor Estate.

(WIMBLEDON, S.W.).—School and institute (£10,000), for the trustees of Cottenham Park Wesleyan church; secretary).

MANCHESTER.—Holy Name Roman Catholic school (570 places), Dover Street, Chorlton-on-Medlock; rector.

MIRFIELD (YORKS.).—Bank, St. Paul's Road, for the Halifax Permanent Benefit Building Society; secretary.

PERTH.—Warehouses for Campbell, McLaggan & Co., merchants; the manager.

PLYMOUTH.—Additions, Tivoli Theatre; M. Fredman.

PRESTON.—Cinema, Church Street, for the Provincial Theatres, Ltd.

ROMSEY (HANTS.).—Houses (100), for A. R. Wills, Botley Road; T. Draper, builder, Fareham.

ROSSINGTON.—Colliery offices, deputation, &c., rooms; Wade & Boucher, builders, Doncaster.

ROTHERHAM.—Church hall, Clifton (£5,000); Colonel Knight, architect. Welfare centre and clinic, for the borough E.C.; J. A. Mair, secretary.

ST. ALBANS.—Extensions, Camp school (£5,000), for Herts. E.C.; director of education, Hertford.

SHIPLEY.—Warehouse, Duckfield Road; F. Mann, Ltd.

SHIRLEY.—34 houses, Shirley Avenue; Paish, Tyler and Crump.

SOUTH KIRKBY.—Additions to Diamond Jubilee Working Men's Club; Garside & Pennington, architects, Ropergate, Pontefract.

TEDDINGTON.—Memorial hospital (£17,711); Grace and Marsh, builders.

TORQUAY.—School, Barton (600 places), for the Borough E.C.; Herbert A. Hield, clerk.

TYNEMOUTH.—200 houses, Cullercoats; Corporation housing architect.

UXBRIDGE.—Extensions, mill premises; Bell Punch and Printing Co., Ltd. 58 houses, Rockingham Estate; Building & Public Works Construction Co., Ltd.

VELINDRE (CARD.).—Mill, for W. Jones, woollen manufacturer; Ogof Mill.

WAKEFIELD.—Extensions to male casual wards at Union House; plans and specifications, W. H. Watson, Baistow Square; tenders to H. D. Gowers, clerk to the guardians, Tetley House, 47, Kirkgate.

WEST WITTERING (SUSSEX).—Additions to Russel Cottage, for H.R.H. Princess Marie Louise D'Orleans.

WOLVERHAMPTON.—Public abattoirs, ice-making plant, &c. (£70,000), for the T.C.; H. B. Robinson, borough engineer.

YORK.—Extensive alterations, Colliergate, for Barnitts, Ltd.